United States Department of the Interior

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IN REPLY REFER TO:
7240(OR-115)

FEB 01 2008

Mr. Bill Meyers, Rogue Basin TMDL Coordinator
Oregon Department of Environmental Quality
221 Stewart Ave., Suite 201
Medford, OR 97501

Dear Mr. Meyers:

This letter transmits the Medford District Bureau of Land Management (BLM) *Water Quality Restoration Plan* (WQRP) *for the Big Butte Creek Fifth-field Watershed.* WQRP implementation is the primary mechanism to address and restore impaired waters on BLM-administered lands. This WQRP describes how the BLM will meet Oregon water quality standards for 303(d) listed streams on BLM-managed lands. It contains information that supports the Oregon Department of Environmental Quality's (DEQ) Big Butte Creek Watershed Total Maximum Daily Load. The plan's organization is designed to be consistent with the DEQ's Rogue Basin Water Quality Management Plan when it is completed.

This WQRP is submitted as part of the BLM's responsibilities under the 2003 Memorandum of Agreement between the DEQ and the BLM. The WQRP was developed in coordination with the DEQ.

The BLM appreciates your assistance in the WQRP development and looks forward to receiving your written comments and/or approval of the Big Butte Creek WQRP. Please contact Shawn Simpson, Butte Falls Resource Area Hydrologist, at 541-618-2460, if you have any questions regarding this WQRP.

Sincerely,

Christopher J McAlear

Christopher J. McAlear
Field Manager
Butte Falls Resource Area

Water Quality Restoration Plan

Southern Oregon Coastal Basin

Big Butte Creek Watershed

Bureau of Land Management (BLM)

Medford District

Butte Falls Resource Area

January 2008

Big Butte Creek Watershed at a Glance	
Hydrologic Unit Code Number (Big Butte Creek)	**1710030704**
WQRP Area/Ownership	Total: 158,330 acres BLM: 29,544 acres (19%) U. S. Forest Service: 58,168 acres (37%) City of Medford: 1,427 acres (1%) Private: 69,144 acres (44%) Oregon Dept. of Forestry: 40 acres (<1%)
303(d) Stream Miles Assessed	Total: 54.2 miles BLM Ownership: 17.2 miles
303(d) Listed Parameters	Temperature, Dissolved Oxygen, E. Coli
Key Resources and Uses	Salmonids, domestic, aesthetic
Known Human Activities	Agriculture, forestry, roads, recreation, rural residential development
Natural Factors	Geology: volcanic Soils: various series and complexes

Statement of Purpose

This water quality restoration plan is prepared to meet the requirements of Section 303(d) of the 1972 Federal Clean Water Act.

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Element 1. Condition Assessment and Problem Description

A. Introduction

This document describes how the Bureau of Land Management (BLM) will meet Oregon water quality standards for 303(d) listed streams on BLM-administered lands within the Big Butte Creek Watershed. It contains information that will support the Oregon Department of Environmental Quality's (DEQ) development of the Rogue Basin Total Maximum Daily Load (TMDL). Its organization is designed to be consistent with the DEQ's Rogue Basin Water Quality Management Plan (WQMP) when it is completed. The area covered by this Water Quality Restoration Plan (WQRP) includes all lands managed by the BLM Medford District within the Big Butte Creek Watershed.

Beneficial Uses

The Oregon Environmental Quality Commission has adopted numeric and narrative water quality standards to protect designated beneficial uses (Table 1). In practice, water quality standards have been set at a level to protect the most sensitive uses. Cold-water aquatic life such as salmon and trout are the most sensitive beneficial uses (Table 2) in the Rogue Basin (ODEQ 2004:5). Seasonal standards may be applied for uses that do not occur year-round.

Table 1. Beneficial Uses in the Big Butte Creek Watershed (ODEQ 2004:5)

Beneficial Use	*Occurring*	*Beneficial Use*	*Occurring*
Public Domestic Water Supply	✓	Anadromous Fish Passage	✓
Private Domestic Water Supply	✓	Salmonid Fish Spawning	✓
Industrial Water Supply	✓	Salmonid Fish Rearing	✓
Irrigation	✓	Resident Fish and Aquatic Life	✓
Livestock Watering	✓	Wildlife and Hunting	✓
Boating	✓	Fishing	✓
Aesthetic Quality	✓	Water Contact Recreation	✓
Commercial Navigation & Trans.		Hydro Power	✓

Table 2. Sensitive Beneficial Uses in the Big Butte Creek Watershed

Sensitive Beneficial Use	*Species*[1]
Salmonid Fish Spawning and Rearing	Coho (t), summer and winter steelhead trout (c), spring chinook
Resident Fish and Aquatic Life	Resident Fish: Rainbow trout, cutthroat trout (c), sucker, sculpin Other Aquatic Life: Pacific giant salamander, western pond turtle (s), beaver, and other species of frogs, salamanders, and snakes

1/ Status: (t) = threatened under Federal Endangered Species Act (ESA); (c) = candidate; and (s) = sensitive.

Listing Status

Section 303 of the Clean Water Act of 1972, as amended by the Water Quality Act of 1987, provides direction for designation of beneficial uses and limiting discharge of pollutants to waters of the state. The DEQ includes streams that do not meet established water quality criteria for one or more beneficial uses on the state's 303(d) list, which is revised every two years, and submitted to the Environmental Protection Agency (EPA) for approval. Section 303 of the Clean Water Act further requires that TMDLs be developed for waters included on the 303(d) list. A TMDL defines the amount of pollution that can be present in the waterbody without causing water quality standards to be violated. A WQMP is developed to describe a strategy for reducing water pollution to the level of the load allocations and waste load allocations prescribed in the TMDL. The approach is designed to restore the water quality and result in compliance with the water quality standards, thus protecting the designated beneficial uses of waters of the state.

This WQRP addresses all stream listings on the 2004/2006 303(d) list for the plan area: one stream listed for exceeding the bacteria (E. coli) criterion, one stream exceeds the Dissolved Oxygen (DO) criterion, and seven streams listed for exceeding the temperature criterion (Table 3). In addition to these stream listings, Willow Creek exceeds the temperature criterion (Table 3). Willow Creek is located on U.S. Forest Service (USFS)-administered land and will not be addressed in this WQRP for BLM-administered land.

Table 3. 2004/2006 303(d) Listings in the Big Butte Creek Watershed (ODEQ 2007)

303(d) List Date	Stream Segment	Listed Parameter	Season	Applicable Rule (at time of listing)	Total Miles Affected
2002	Big Butte Creek	Dissolved Oxygen	Summer	OAR 340-041-0016(1)(a)(c)(2)	11.6
2004	Big Butte Creek	Bacteria (E. coli)	Summer	OAR 340-041-0009(1)(a)(A,B)	11.6
1998	Big Butte Creek	Temperature	Summer	OAR 340-041-0365(2)(b)(A)	11.6
2004	Clark Creek	Temperature	Year-round (non-spawning season)	OAR 340-041-0028(4)(b)	7.7
2004	Dog Creek	Temperature	Oct 15 – June 15	OAR 340-041-0028(4)(a)(b)	0.5
2004	Dog Creek	Temperature	Year-round (non-spawning season)	OAR 340-041-0028(4)(b)	4.7
2004	Doubleday Creek	Temperature	Year-round (non-spawning season)	OAR 340-041-0028(4)(b)	3.4
2004	Hukill Creek	Temperature	Year-round (non-spawning season)	OAR 340-041-0028(4)(b)	3.6
2004	Jackass Creek	Temperature	Oct 15 – June 15	OAR 340-041-0028(4)(a)(b)	0.3
2004	Jackass Creek	Temperature	Year-round (non-spawning season)	OAR 340-041-0028(4)(b)	4.8
2004	North Fork Big Butte Creek	Temperature	Jan 1 – June 15	OAR 340-041-0028(4)(a)(b)	6.9
2004	North Fork Big Butte Creek	Temperature	Oct 15 – June 15	OAR 340-041-0028(4)(a)(b)	7
2004	North Fork Big Butte Creek	Temperature	Year-round (non-spawning season)	OAR 340-041-0028(4)(b)	13.9
1998	Willow Creek	Temperature	Summer	OAR 340-041-0365(2)(b)(A)	4.5
Total Stream Miles listed for Bacteria (E. coli) Criteria (Summer)					11.6
Total Stream Miles listed for DO Criteria (Summer)					11.6
Total Stream Miles listed for Temperature Criteria (Oct 15 – June 15)					7.8
Total Stream Miles listed for Temperature Criteria (Summer)					16.1
Total Stream Miles listed for Temperature Criteria (Year-round (non-spawning season))					38.1
Total Stream Miles listed for Temperature Criteria (Jan 1 – June 15)					6.9

Within the plan area, there are a total of 54.2 stream miles on the 2004/2006 303(d) list, of which 17.2 miles cross BLM-managed lands. The water quality limited stream reaches on BLM-managed lands are

- Big Butte Creek - 2.0 miles for summer temperature, dissolved oxygen, and E. coli;
- Clark Creek - 3.0 miles for year-round (non-spawning season) temperature;
- Dog Creek - 1.3 miles for year-round (non-spawning season) temperature;
- Doubleday Creek - 1.5 miles for year-round (non-spawning season) temperature;
- Hukill Creek - 0.5 miles for year around (non-spawning season) temperature;
- Jackass Creek - 2.4 miles for year-round (non-spawning season) temperature; and
- North Fork Big Butte Creek - 6.5 miles for year-round (non-spawning season) temperature.

B. Watershed Characterization

The Big Butte Creek Watershed covers approximately 247 square miles (158,330 acres) in the southern Cascade range in southwestern Oregon (Figure 1). The Big Butte Creek Watershed lies within the Upper Rogue Subbasin (Figure 2), which is subdivided into eight watersheds: Upper Rogue River, South Fork Rogue River, Rogue River-Lost Creek, Big Butte Creek, Elk Creek-Rogue River, Trail Creek, Rogue River-Shady Cove, and Little Butte Creek (Figure 3). Elevation ranges from approximately 1,530 feet at the mouth of Big Butte Creek to 9,495 feet at the top of Mount McLoughlin. Major tributaries to Big Butte Creek include Clark, Dog, Doubleday, Hukill, Ginger, North Fork Big Butte, South Fork Big Butte, and Willow Creeks.

The Big Butte Creek Watershed lies within Jackson County, Oregon. The plan area is northeast of the city of Medford and southeast of the town of Trail. The town of Butte Falls is near the confluence of the North and South Forks Big Butte Creek.

Figure 1. Location of the Big Butte Creek Watershed

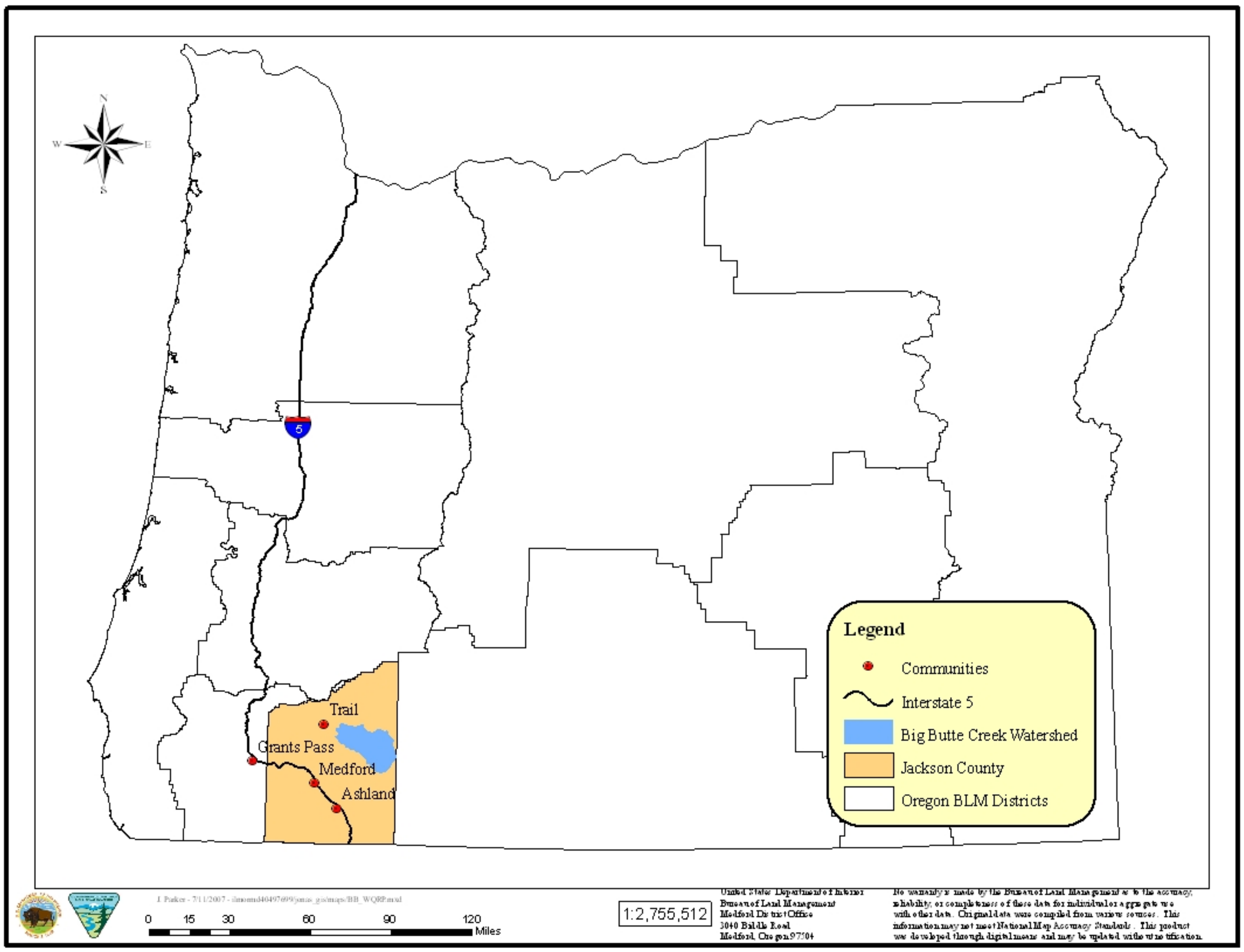


Figure 2. Rogue Basin and the Upper Rogue Subbasin

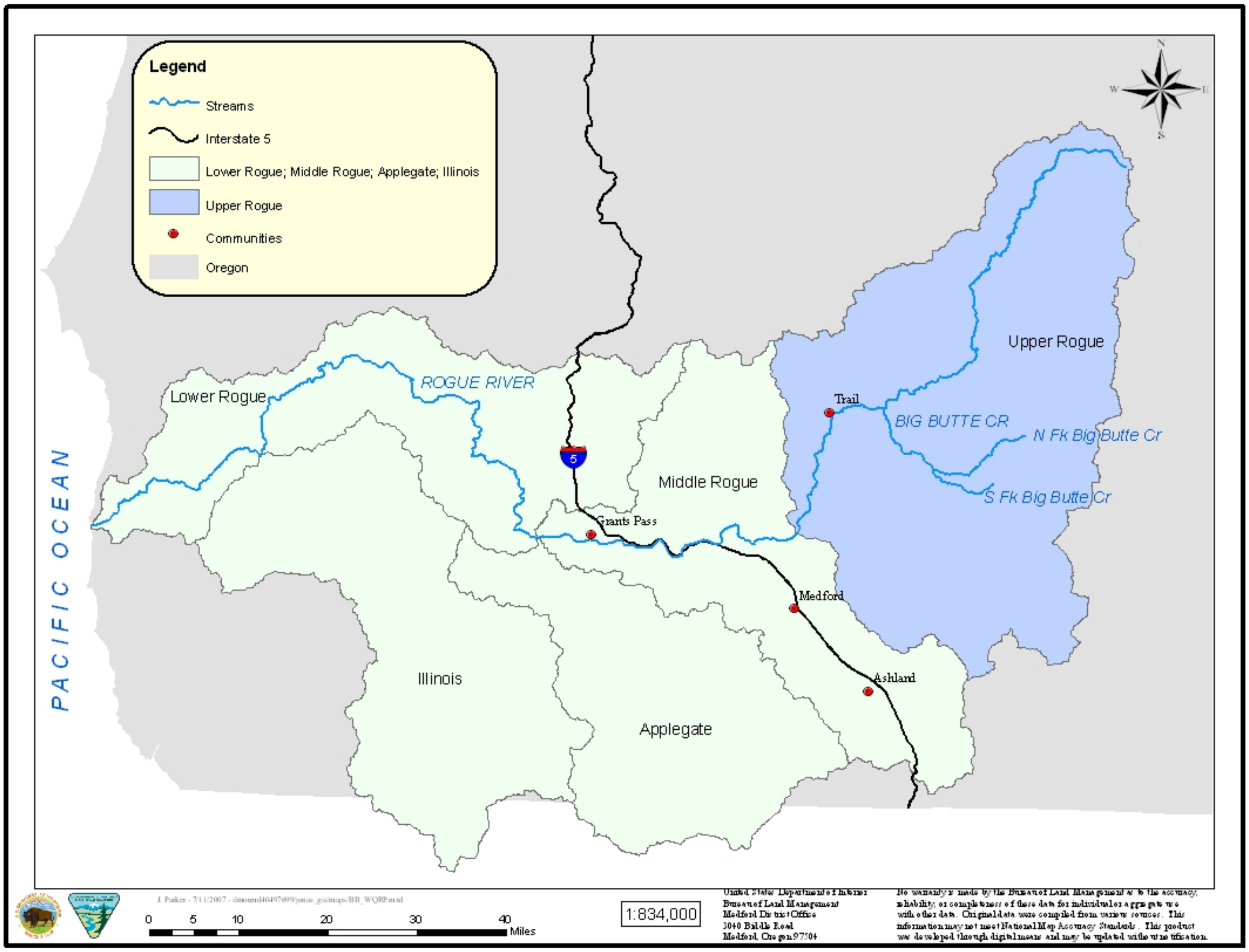
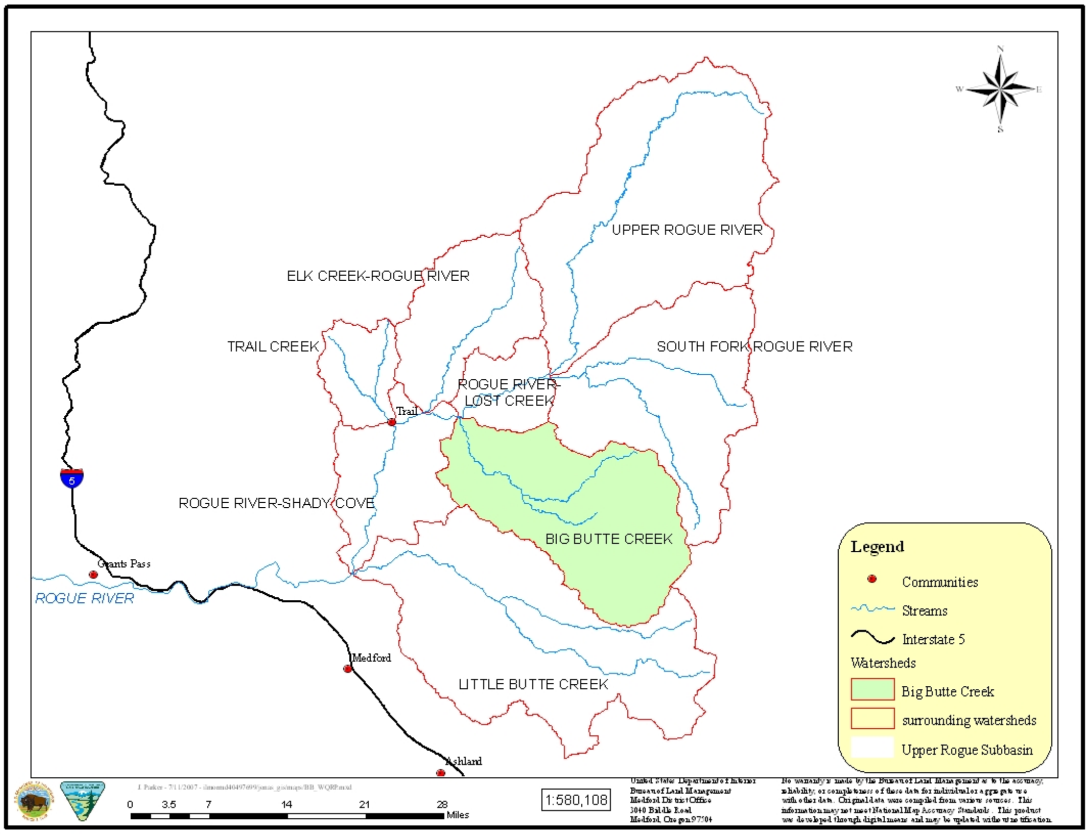


Figure 3. Watersheds in the Upper Rogue Subbasin



Land Ownership and Use

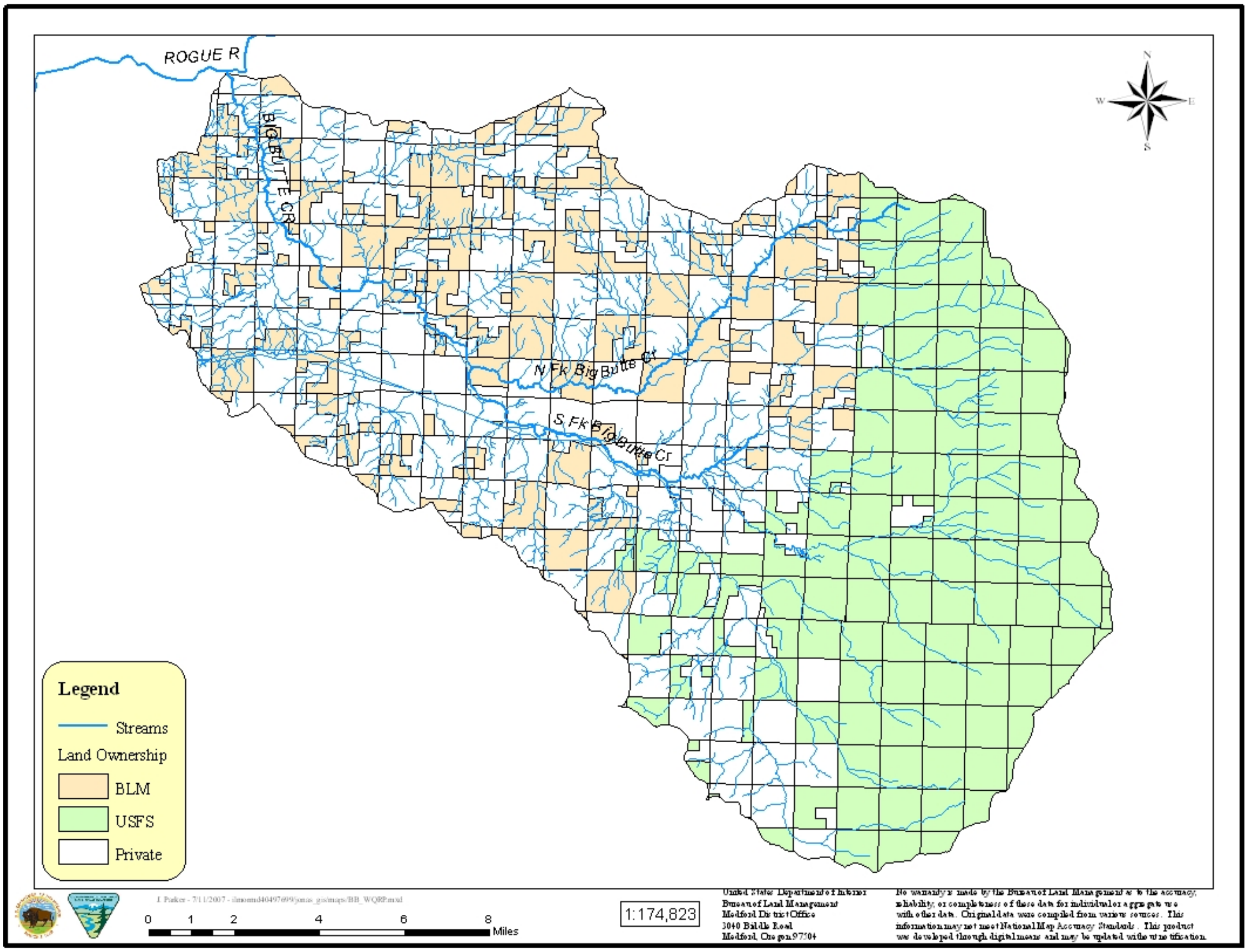
The BLM manages 29,554 acres (19 percent) within the Big Butte Watershed (Table 4 and Figure 4). The Butte Falls Resource Area is the BLM administrative unit that manages lands for the Medford District. The USFS, Rogue River National Forest, manages 58,168 acres (37 percent) within the Big Butte Creek Watershed. The City of Medford manages 1,427 acres (1 percent) and the remaining 44 percent of the plan area consists of private lands.

BLM-administered lands occupy a "checkerboard" pattern with private lands in the lower and middle elevations of the Big Butte Creek Watershed, and the Forest Service lands are mostly a contiguous block in the higher elevations. Some of the large blocks of private lands are managed as industrial forest and ranches, while ownership of the remaining privately-held land in the watershed is typically held in relatively small parcel holdings.

Table 4. Ownership within the Big Butte Creek Watershed

Ownership	Acres	Percent
BLM - Butte Falls Resource Area	29,544	19%
USFS	58,168	37%
City of Medford	1,427	1%
Private	69,144	44%
Oregon Department of Forestry	40	<.1%
Total	**158,330**	100%

Figure 4. BLM Land Ownership in the Big Butte Creek Watershed



BLM land allocations within the plan area include matrix, Connectivity Blocks, and Riparian Reserves. Special areas include Poverty Flats Area of Environmental Concern. Objectives and management actions/directions for these land allocations and special areas are found in the *Medford District Record of Decision and Resource Management Plan* (USDI 1995a:24-40; 56-68).

The Northwest Forest Plan (NWFP) (USDA and USDI 1994) Standards and Guidelines incorporate the Aquatic Conservation Strategy (ACS) (amended March 2004, USDA and USDI 2004) to restore and maintain the ecological health of watersheds and aquatic ecosystems contained within them on public lands.

Major land uses in the Big Butte Watershed include agriculture, timber, and recreation. Cattle operations are the largest non-forestry agricultural venture. The BLM manages 9 grazing allotments within the plan area, of which 8 (approximately 74,483 acres) are currently in use.

Early settlers arrived in the project area in the 1860s and established camps to cut sugar pine shakes, cedar posts, and cord wood. In 1904, the Big Bend Milling Company built a water-powered sawmill at the falls on Big Butte Creek. The company was replaced by the Butte Falls Sugar Pine Lumber Company who surveyed a town site above Butte Creek in 1905. They cleared the area of trees to build the town of Butte Falls, named for the falls on Big Butte Creek. Butte Falls was incorporated in 1911 and the town requested a water right on Ginger Springs in order to supply the town with water.

The completion of the Pacific and Eastern Railroad from Butte Falls to Medford provided a means for getting wood to the market. Much of the land that was logged by the early lumber companies was purchased from homesteaders. By the 1920s, the lumber mills in Butte Falls had closed and the logs were shipped by railroad to mills in Medford for processing. In the early 1930s, Medford Corporation purchased the private forest lands in this area previously owned by the Brownlee-Olds Lumber Company. By the mid-1940s, much of the mature timber on Medford Corporation land had been harvested and there was increase demand for harvest on the federal lands. The harvest of private land had produced 70 miles of railroad spurlines out into the surrounding area. In the 1950s, road improvements and the increased use of trucks to haul the timber lead to the removal of many of the spurlines. Logs were hauled to Butte Falls by truck and shipped by railroad to be to the mill in Medford. By the 1960s, the Medford Corporation stopped shipping timber by rail and all logs were hauled to Medford by trucks.

Passage of the Oregon and California (O&C) Act in 1937 provided direction for Federal lands managed by the BLM in this area. The O&C Act was intended to contribute to the local economy by providing for federal timberlands to be managed for permanent timber production on a sustained yield basis. One of the purposes of the O&C Act was to increase timber harvest on these lands to their timber producing capacity. Timber harvest revenues were to provide a consistent level of income to the counties that contain O&C lands. Under the O&C Act, these counties are entitled to 50 percent of the timber receipts.

Land ownership patterns, past timber harvest, wild fires, and fire exclusion have contributed to the existing conditions in the Big Butte Creek 5th field watershed. Fire exclusion and harvest methods have contributed to the current high density and multiple-layered stand conditions in many of the proposed harvest units. Past harvest methods also influenced the locations and conditions of the roads within this watershed.

Logging continued through the 1980s, however, silvicultural prescriptions changed from clearcut to shelterwood harvests. Since the implementation of the Medford District RMP in 1995, six timber sales have occurred on BLM-administered lands in the Big Butte Creek 5th field watershed: Rancheria Timber Sale (950 acres) in 1996, Tokyo Ginger Timber Sale (341 acres) in 1996, Fred N Jack Timber Sale (1,376 acres) in 1996, Titanic Timber Sale (481acres) in 1998, Ginger Springs Timber Sale (263 acres) in 2000, and Lower Big Butte Timber Sale (786 acres) in 2002.

These harvests were designed under the Northwest Forest Plan and prescriptions were primarily for density management with some regeneration. Timber sales in the Big Butte Creek Watershed scheduled to be offered in 2005 include Camp Cur (760 acres) and in 2008 Bowen Arrow/Twin Ranch.

Recreation activities occur on a year-round basis throughout the Big Butte Creek Watershed. Summer use is dominated by camping (at developed and dispersed sites), hiking, picnicking, and fishing but includes other activities such as mountain biking, horseback riding, off-highway vehicle (OHV) use, and pleasure driving. Fall use is primarily big game hunting. Winter uses are mostly centered on Nordic skiing and snowmobiling, but also include activities such as fishing and winter camping. There are no developed facilities managed by BLM within the plan area.

Roads distributed throughout the plan area provide vehicle access to managed forestlands, residences, and recreational areas. There are approximately 1,056 road miles within the Big Butte Creek Watershed, of which 17 percent are controlled by the BLM and 30 percent by the Forest Service.

Geology

The Big Butte Watershed is located in the Cascades Physiographic Province, which is composed of two volcanic subprovinces: the Western and High Cascades. BLM-administered lands within the Big Butte Creek Watershed are primarily found in the Western Cascades, while most of the High Cascades are managed by the Forest Service. The Western Cascade geology is composed of older, softer volcanic materials. High Cascade rock types are much younger and are composed mainly of harder lava flows.

The Western Cascades are deeply dissected and have a well-developed dendritic drainage pattern in response to landsliding and surface erosion. A majority of the Western Cascades are dominated by lava flows of basaltic andesite, basalt, and andesite. These lavas are interlayered with softer pyroclastic flows of andesitic tuff, basaltic breccia, ash flow tuff, dacite tuff, and andesitic breccia. Western Cascade soils have a higher clay content than the High Cascades soils and, consequently, have much lower infiltration rates.

High Cascades lava flows are characterized as having gentler, smoother, and much less dissected slopes than the Western Cascades. The High Cascades materials are less erodible and not as unstable as the Western Cascades soils and rocks. Rock types of the High Cascades include basaltic andesite, andesite, and basalt lavas. High Cascades soils contain more silt, sand, and gravels than the Western Cascades and are generally shallower and less weathered.

Climate

Mild, wet winters and hot, dry summers characterize the Big Butte Watershed. During the winter months, the moist, westerly flow of air from the Pacific Ocean results in frequent storms of varied intensities. Average annual precipitation ranges from approximately 35 inches at the mouth of Big Butte Creek to approximately 80 inches on the upper slopes of Mount McLoughlin (USDI 1999 and USDA 1995). Winter precipitation in the higher elevations (generally above 5,000 feet) usually occurs as snow, which ordinarily melts during the spring runoff season from April through June. Rain predominates in the lower elevations (generally less than 3,500 feet) with the majority occurring in the late fall, winter, and early spring. A mixture of snow and rain occurs between approximately 3,500 feet and 5,000 feet and this area is referred to as either the rain-on-snow zone or transient snow zone. The snow level in this zone fluctuates throughout the winter in response to alternating warm and cold fronts. The transient snow zone occupies approximately 35 percent of the Big Butte Creek Watershed, while the snow and rain-dominated precipitation zones occupy 56 and 9 percent, respectively.

During the summer months, the plan area is dominated by the Pacific high pressure system, which results in hot, dry summers. Summer rainstorms occur occasionally and are usually of short duration and limited area coverage. Air temperatures can display wide variations daily, seasonally, and by elevation.

Streamflows

Streamflows in the Big Butte Watershed fluctuate with seasonal variation of precipitation. Moderate to high flows generally occur from mid-November through May. Streamflows during the months of April and May and part of June are augmented by melting snowpack in the high elevations.

Low flows for Big Butte Creek normally coincide with the period of low precipitation from July through September or October.

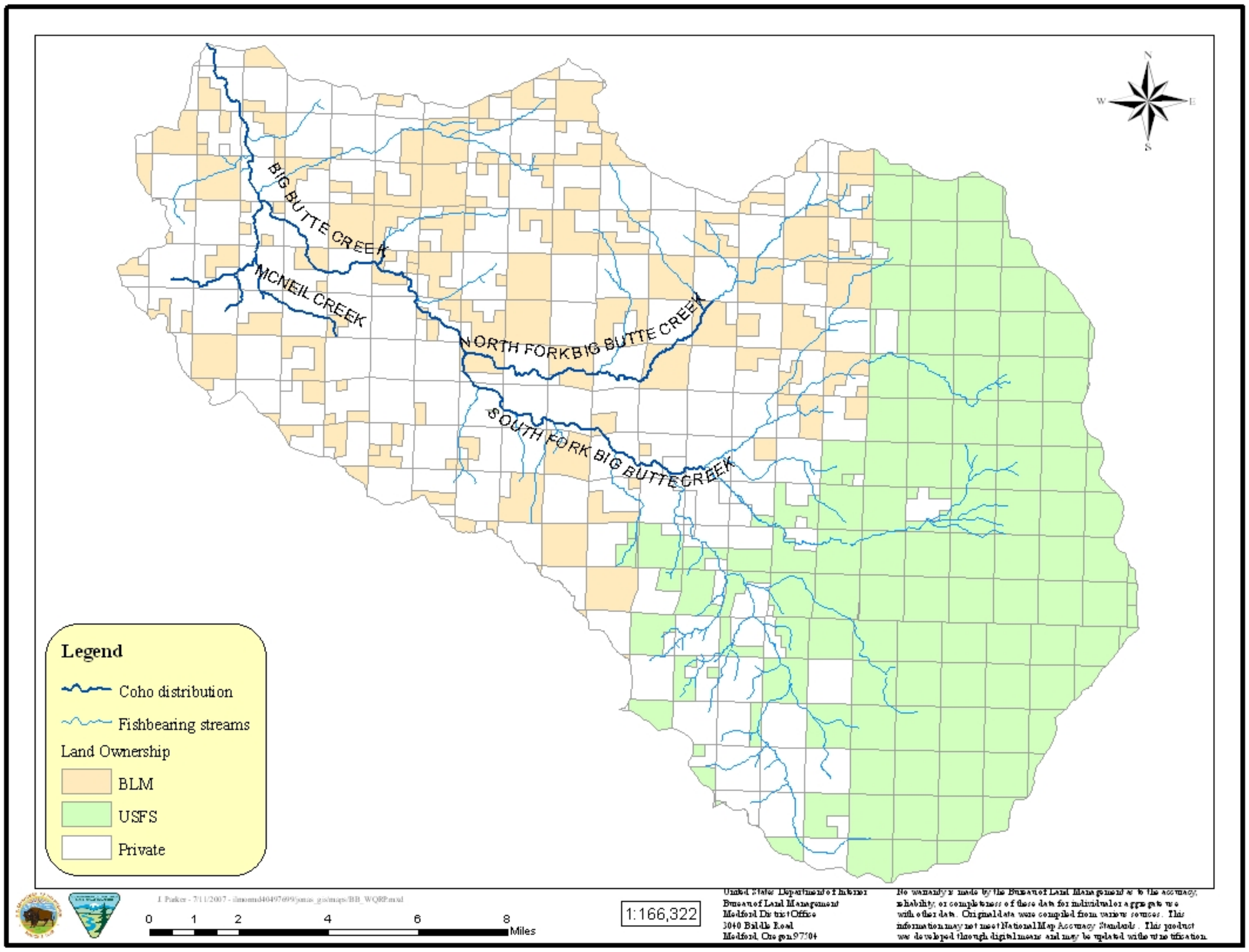
Aquatic Wildlife Species

There are three native anadromous salmonids that spawn and rear in the Big Butte Creek Watershed: coho salmon, chinook salmon (spring runs), and steelhead trout (summer and winter runs). The BLM manages

19 percent of the land within the Watershed and 31 percent of the anadromous salmonid habitat crosses BLM-administered land.

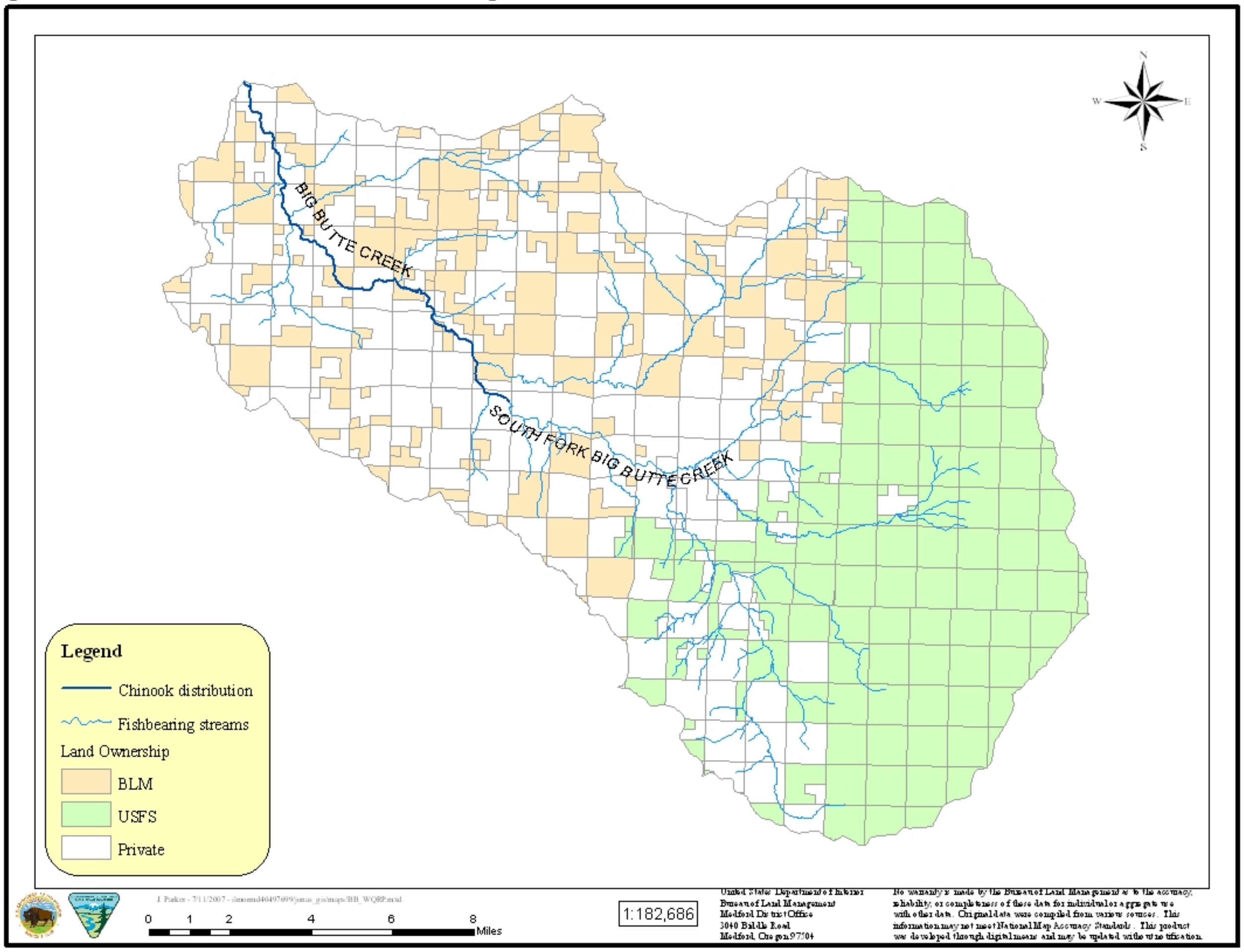
Northern California/Southern Oregon Coho salmon (*Oncorhynchus kisutch*), a species listed as threatened under the Endangered Species Act (May 1997) are present in Big Butte, North and South Forks Big Butte, McNeil, Neil, Jackass, and Dog Creeks for a total of 37.2 miles (Figure 5).

Figure 5. Coho Distribution in the Big Butte Creek Watershed



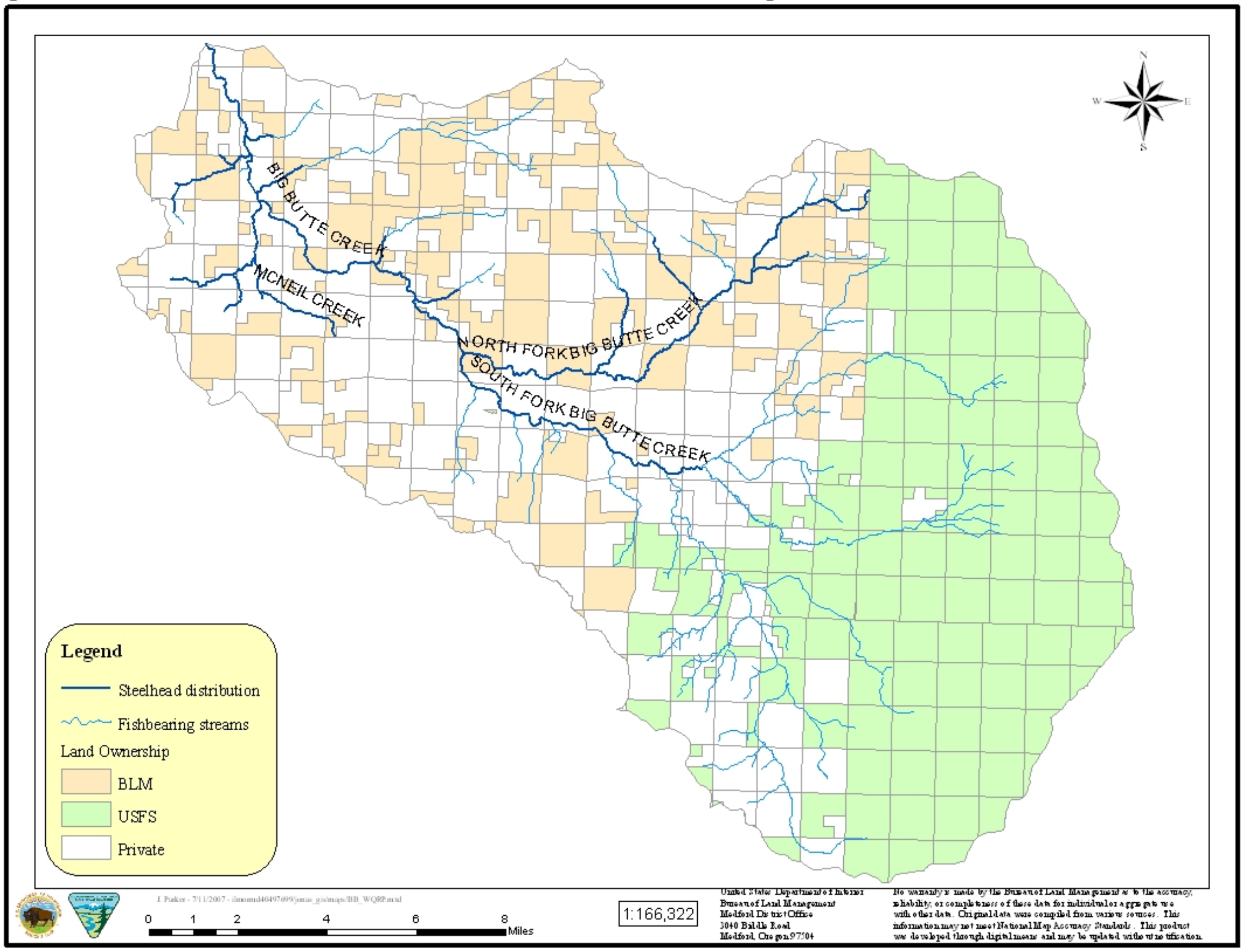
Spring chinook salmon (*O. tshawytscha*) spawn in Big Butte Creek and up 1.5 miles of South Fork Big Butte Creek (Figure 6). Coho and chinook salmon spawn in the fall.

Figure 6. Chinook Distribution in the Big Butte Creek Watershed



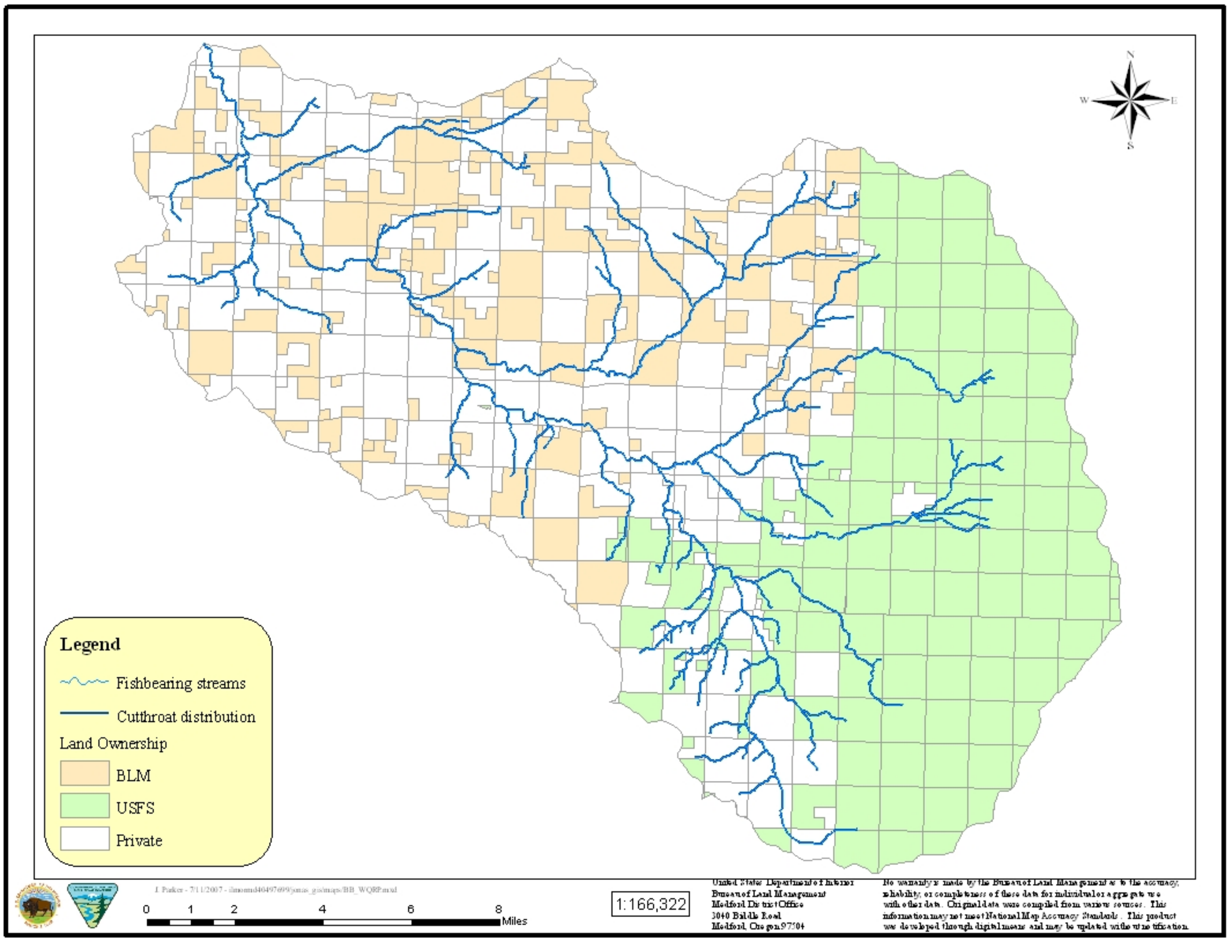
Summer and winter steelhead (*O. mykiss*) use a total of 53.9 miles of habitat in Big Butte, North and South Forks Big Butte, Crowfoot, McNeil, Neil, Camp, and the lower reaches of Jackass, Eighty Acre, Dog, Clark, Box, and Vine Creeks (Figure 7). Summer and winter steelhead trout spawn from January to May.

Figure 7. Summer and Winter Steelhead Distribution in the Big Butte Creek Watershed



Native resident fish species in the Big Butte Creek Watershed (Figure 8) include cutthroat trout (*O. clarki*), rainbow trout (*O. mykiss*), and reticulate sculpin (*Cottus perplexus*). Resident trout are found in Big Butte, North and South Forks Big Butte, McNeil, Neil, Jackass, Dog, Doubleday, Hukill, and Clark Creeks as well as several other tributaries for a total of 177.5 miles.

Figure 8. Resident Trout Distribution in the Big Butte Creek Watershed



Pacific giant salamanders have been observed throughout the plan area, although little is known about their status.

The major limiting factors influencing aquatic species distribution and instream habitat condition are: high summer stream temperatures and sedimentation of pools and spawning gravels, and lack of large woody debris. Other limiting factors include: riparian degradation, instream degradation, fish passage barriers, and wetland and floodplain losses (USDI 1995, 1999).

Watershed Analysis

The Northwest Forest Plan (NWFP) Standards and Guidelines (USDA and USDI 1994) incorporate the Aquatic Conservation Strategy (ACS) (amended March 2004, USDA and USDI 2004) to restore and maintain the ecological health of watersheds and aquatic ecosystems contained within them on public lands. Watershed analyses are a required component of the ACS under the NWFP. The *Lower Big Butte Watershed Analysis* and the *Central Big Butte Watershed Analysis* includes the lands administered by the BLM in the Big Butte Creek Watershed. This WQRP tiers to and appends the watershed analysis. A summary of historical and present watershed conditions in the Big Butte Watershed has been compiled from the two watershed analysis (Table 5). The analysis and recommendations found in this WQRP use data from the watershed analysis. Additional analysis and recommendations have been included in this WQRP where the watershed analysis data were incomplete or new information was available.

Table 5. Summary of Watershed Conditions on BLM-Administered Lands in the Big Butte Creek Watershed

Riparian Vegetation	
Historical Condition	• Late seral vegetation dominant. • Diverse mix of species and age classes.
Present Condition	• Mature hardwoods and small-diameter conifers with dense understory. • Non-native blackberries along lower elevation stream corridors.
Forest Health & Productivity	
Historical Condition	• Frequent, low intensity fires maintained low fuel levels and open under-story. • Forest stands had fewer trees per acre with trees of larger diameter. • Forest stands had diverse age classes. • Forests predominately composed of Douglas-fir, pine, and hardwood mixtures. • Areas of open mature oak forest.
Present Condition	• Fire exclusion resulting in high fuel loads. • High vegetation densities resulting in low vigor and/or poor growth. • Forest stands lack resiliency. • Forests experiencing mortality due to beetle infestations.
Large Wood	
Historical Condition	• Probably an adequate supply of large wood in the stream channels.
Present Condition	• Some stream reaches lack adequate large wood. • Road stream crossings disrupt transport of wood and sediment.
Roads	
Historic Condition	• Few roads before industrial timber harvesting began in the early 1950s.
Present Condition	• Areas with high road density. • Roads in riparian areas. • High number of stream crossings with many culverts undersized for 100-year flood. • Stream network extension (due to road ditch lines) increases winter peak flows.
Flow Regime	
Historic Condition	• Channel morphology developed in response to climatic conditions and natural ranges of streamflows. • Most likely, peak flows were lower in magnitude and frequency. • Summer low flows were directly related to the amount and timing of precipitation events.
Present Condition	• Winter peak flows possibly increased by roads and harvest. • Summer low flows reduced by water withdrawals.

C. Temperature

Introduction

The most sensitive beneficial uses affected by excessive temperatures include resident fish and aquatic life, salmonid fish spawning, and rearing (ODEQ 2004:5).

The Oregon water quality temperature standard that applies to the Big Butte Watershed was approved by EPA on March 2, 2004 and is found in OAR 340-041-0028 (4) (a-c) (ODEQ 2006). Excerpts of the 2004 standard read as follows:

> *(4) Biologically Based Numeric Criteria. Unless superseded by the natural conditions criteria described in section (8) of this rule, or by subsequently adopted site-specific criteria approved by EPA, the temperature criteria for State waters supporting salmonid fishes are as follows:*
>
> *(a) The seven-day-average maximum temperature of a stream identified as having salmon and steelhead spawning use on subbasin maps and tables set out in OAR 340-041-0101 to OAR 340-041-0340: Tables 101B, and 121B, and Figures 130B, 151B, 160B, 170B, 220B, 230B, 271B, 286B, 300B, 310B, 320B, and 340B, may not exceed 13.0 degrees Celsius (55.4 degrees Fahrenheit) at the times indicated on these maps and tables;*
>
> *(b) The seven-day-average maximum temperature of a stream identified as having core cold water habitat use on subbasin maps set out in OAR 340-041-101 to OAR 340-041-340: Figures 130A, 151A, 160A, 170A, 220A, 230A, 271A, 286A, 300A, 310A, 320A, and 340A, may not exceed 16.0 degrees Celsius (60.8 degrees Fahrenheit);*
>
> *(c) The seven-day-average maximum temperature of a stream identified as having salmon and trout rearing and migration use on subbasin maps set out at OAR 340-041-0101 to OAR 340-041-0340: Figures 130A, 151A, 160A, 170A, 220A, 230A, 271A, 286A, 300A, 310A, 320A, and 340A, may not exceed 18.0 degrees Celsius (64.4 degrees Fahrenheit);*

Fish Use maps 271A and 271B for the Rogue Basin temperature water quality standards can be found online at http://www.deq.state.or.us/regulations/rules.htm. Salmon and steelhead spawning use designations (map 271B) vary by stream. The seven-day average maximum temperature for these streams may not exceed 13.0°C (55.4°F) during the stated period of spawning use. Perennial streams in the Big Butte Watershed are designated as core cold-water habitat on fish use map 271A, therefore the seven-day-average maximum for these streams may not exceed 16.0°C (60.8°F) outside the salmon and steelhead period of spawning use.

A stream is listed as water quality limited for temperature if there is documentation that the seven-day moving average of the daily maximums (7-day statistic) exceeds the appropriate standard listed above. This represents the warmest seven-day period and is calculated by a moving average of the daily maximums.

All streams listed for temperature are based on a 2004 list date except for Big Butte Creek which is listed based on a 1998 list date (Table 3). This listing uses the State of Oregon water quality standards adopted in 1996. Excerpts of the 1996 standard (OAR 340-041-0365(2)(b)) read as follows:

> A) *To accomplish the goals identified in OAR 340-041-0120(11), unless specifically allowed under a Department-approved surface water temperature management plan as required under OAR*

340-041-0026(3)(a)(D), no measurable surface water temperature increase resulting from anthropogenic activities is allowed:
(i) In a basin for which salmonid fish rearing is a designated beneficial use, and in which surface water temperatures exceed 64.0°F (17.8°C);
(ii) In waters and periods of the year determined by DEQ to support native salmonid spawning, egg incubation, and fry emergence from the egg and from the gravels in a basin which exceeds 55.0°F (12.8°C);
(iii) In waters determined by DEQ to support or to be necessary to maintain the viability of native Oregon bull trout, when surface water temperatures exceed 50.0°F (10.0°C);
(iv) In waters determined by DEQ to be ecologically significant cold-water refugia;
(v) In stream segments containing federally listed Threatened and Endangered species if the increase would impair the biological integrity of the Threatened and Endangered population;
(vi) In Oregon waters when the dissolved oxygen (DO) levels are within 0.5 mg/l or 10 percent saturation of the water column or intergravel DO criterion for a given stream reach or subbasin;
(vii) In natural lakes.

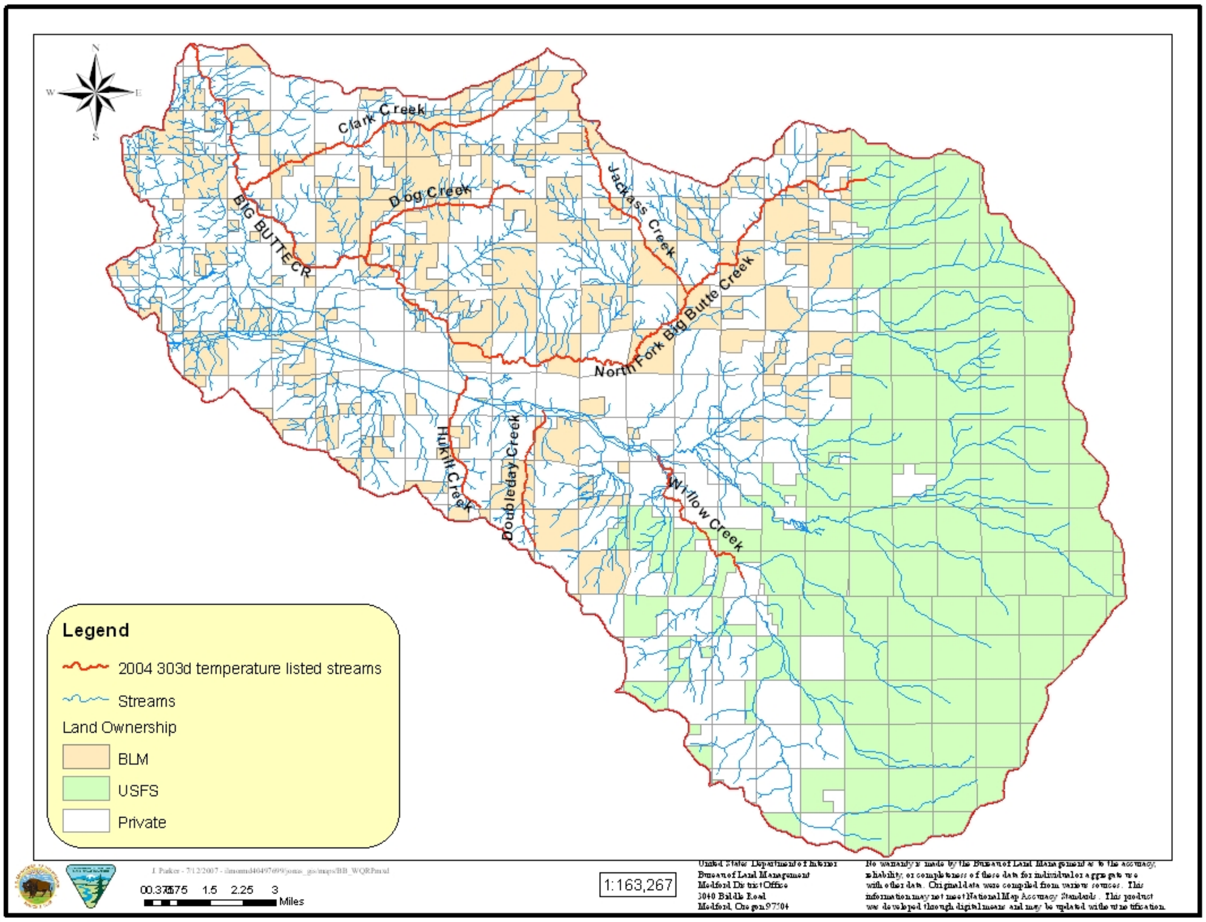
Within the Big Butte Creek Watershed, North Fork Big Butte, Clark, Dog, Doubleday, Hukill, and Jackass Creeks are on the 2004/2006 303(d) list for exceeding the 64.0°F 7-day statistic for rearing salmonids as found in the 1996 standard.

There are a total of 64.4 stream miles listed for temperature in the Big Butte Creek Watershed of which 24 miles are on BLM-administered lands (Table 6 and Figure 9).

Table 6. 303(d) Temperature-Listed Reaches in the Big Butte Watershed.

303(d) List Date	Stream Segment	Season	Applicable Rule (at time of listing)	Total Miles Affected	BLM Miles Affected
2004	Clark Creek	Year-round (non-spawning season)	OAR 340-041-0028(4)(b)	7.7	3.0
2004	Dog Creek	Year-round (non-spawning season)	OAR 340-041-0028(4)(b)	4.7	1.3
2004	Doubleday Creek	Year-round (non-spawning season)	OAR 340-041-0028(4)(b)	3.4	1.5
2004	Hukill Creek	Year-round (non-spawning season)	OAR 340-041-0028(4)(b)	3.6	0.5
2004	Jackass Creek	Year-round (non-spawning season)	OAR 340-041-0028(4)(b)	4.8	2.4
2004	North Fork Big Butte Creek	Year-round (non-spawning season)	OAR 340-041-0028(4)(b)	13.9	6.5
Total Stream Miles listed for Temperature Criteria [Year -round (non-spawning season)]				**38.1**	**15.2**
1998	Big Butte Creek	Summer	OAR 340-041-0365(2)(b)(A)	11.6	2.0
Total Stream Miles listed for Temperature Criteria (Summer)				**11.6**	**2**
2004	Dog Creek	Oct 15-June 15	OAR 340-041-0028(4)(a)(b)	0.5	0.5
2004	Jackass Creek	Oct 15-June 15	OAR 340-041-0028(4)(a)(b)	0.3	0.3
2004	North Fork Big Butte Creek	Oct 15-June 15	OAR 340-041-0028(4)(a)(b)	7	3.4
Total Stream Miles listed for Temperature Criteria (Oct 15-June 15)				**7.8**	**3.4**
2004	North Fork Big Butte Creek	Jan 1- June 15	OAR 340-041-0028(4)(a)(b)	6.9	3.4
Total Stream Miles listed for Temperature Criteria (Jan 1-June 15)				**6.9**	**3.4**

Figure 9. 2004/2006 303(d) Temperature-Listed Streams for the Big Butte Creek Watershed



The BLM collected summertime stream temperature data at locations within the Big Butte Watershed between 1994 and 2007 (Table 7). The 7-day statistics for all sites listed in Table 7 exceed both the 1996 and 2004 temperature criteria.

Table 7. Temperature Summary for the Big Butte Creek Watershed

Stream Name	Period of Record[1]	7-day Statistic (ave. for all years) (ºF)	Range of 7-day Statistic (for all years)	
			Minimum (ºF)	Maximum (ºF)
Big Butte Creek (above Rogue River)	1998, 1999	69.2	54.4	65.0
Big Butte Creek (above Dog Creek)	1994-1999, 2001, 2007	62.4	50.4	64.9
Clark Creek (34S-2E-7)	1995-1999,2001, 2003-2005, 2007	64.7	50.9	70.1
Dog Creek (above Big Butte Creek)	1994-1999, 2003, 2005, 2007	71.7	55.1	75.0
Doubleday Creek (35S-2E-13)	1998, 1999, 2002-2007	65.1	53.6	66.7

Stream Name	Period of Record[1]	7-day Statistic (ave. for all years) (ºF)	Range of 7-day Statistic (for all years)	
			Minimum (ºF)	Maximum (ºF)
Hukill Creek (35S-2E-15)	1995-1999, 2001-2007	63.3	48.6	66.7
Jackass Creek (above North Fork Big Butte Creek	1994-1999, 2001, 2003-2007	68.1	50.8	71.6
North Fork Big Butte Creek (above South Fork confluence)	1994-2002, 2004, 2005, 2007	68.0	58.6	71.7

[1] Temperature measured from June to September

Nonpoint Source Temperature Factors
Stream temperature is influenced by riparian vegetation, channel morphology, hydrology, climate, and geographic location. While climate and geographic location are outside of human control, the condition of the riparian area, channel morphology and hydrology can be altered by land use. Human activities that contribute to degraded thermal water quality conditions in the Big Butte Watershed include: agricultural activity; rural residential developments; water withdrawals; timber harvests; local and forest access roads; and state highways. Timber harvest, roads, and livestock grazing are the primary impacts specific to federally managed lands that have the potential to affect water quality conditions in the plan area. For the Rogue Basin temperature TMDL, there are four nonpoint source factors that may result in increased thermal loads: stream shade, stream channel morphology, flow, and natural sources (ODEQ 2004:8).

Temperature Factor 1: Stream Shade
Stream temperature is driven by the interaction of many variables. Energy exchange may involve solar radiation, long wave radiation, evaporative heat transfer, convective heat transfer, conduction, and advection (USDA and USDI 2005). While interaction of these variables is complex, some are much more important than others (USDA and USDI 2005). The principal source of heat energy for streams is solar energy striking the stream surface (USDA and USDI 2005). Exposure to direct solar radiation will often cause a dramatic increase in stream temperatures. Highly shaded streams tend to experience cooler stream temperatures due to reduced input of solar energy. Stream surface shade is dependent on riparian vegetation height, location, and density. The ability of riparian vegetation to shade the stream throughout the day depends on vegetation height and the vegetation position relative to the stream. For a stream with a given surface area and stream flow, any increase in the amount of heat entering a stream from solar radiation will have a proportional increase in stream temperature (USDA and USDI 2005).

Removal of riparian vegetation, and the shade it provides, contributes to elevated stream temperatures. Activities in riparian areas such as timber harvest, road construction, residential and agricultural clearing, and livestock grazing, have reduced the amount of riparian vegetation in the Big Butte Watershed. Riparian areas in the plan area cover less area and contain fewer species than under historic conditions. They tend to be younger in age and dominated by hardwoods. Conifers, such as Douglas-fir, ponderosa pine, and white fir are a bigger component of the riparian vegetation as the elevation increases, however the average diameter is smaller than what existed historically. Riparian vegetation appears patchy: areas with many layers of riparian vegetation, including large-diameter trees, are scattered in between clumps of even-aged alder and cottonwood and shrub-dominated areas. Woodland stands are fragmented, creating a patchy, poorly connected landscape of simpler and less biologically productive habitat. These changes have resulted in less shade on stream surfaces and an increase in stream water temperatures.

Such altered riparian areas are not sources of large wood and they lack the cool, moist microclimate that is characteristic of healthy riparian zones.

The primary reason for elevated stream temperatures on BLM-managed lands is an increase in solar radiation reaching the stream surface following timber harvest or road construction that removed stream shading vegetation. Pre-NWFP management activities along streams on federal lands in the plan area have left a mosaic of vegetation age classes in the riparian areas. The amount of riparian area with late-successional forest characteristics has declined on federal lands primarily due to timber harvest and road construction within or adjacent to riparian areas. In some cases the large conifers have been replaced by young, small diameter conifer stands and in other cases, hardwoods have replaced conifers as the dominant species in riparian areas. In riparian areas where the trees are no longer tall enough to adequately shade the adjacent streams, the water flowing through these exposed areas is subject to increased solar radiation and subsequent elevated temperatures.

Temperature Factor 2: Stream Channel Morphology

Stream channel morphology can also affect stream temperature. Wide channels tend to have lower levels of shade due to simple geometric relationships between shade producing vegetation and the angle of the sun. For wide channels, the surface area exposed to radiant sources and ambient air temperature is greater, resulting in increased energy exchange between the stream and its environment (ODEQ 2004:8). Conversely, narrow channels are more likely to experience higher levels of shade. An additional benefit inherent to narrower/deeper channel morphology is a higher frequency of pools that contribute to aquatic habitat or cold water refugia (ODEQ 2004:8).

Large wood plays an important role in creating stream channel habitat. Obstructions created by large wood help to settle out gravel. The deposition of gravel helps to decrease thermal loading by reducing the amount of water exposed to direct solar input, as a portion of the water will travel sub-gravel and not be exposed to sun. The loss of large wood in the Big Butte Watershed has had a direct impact on stream channel morphology. Once the large wood was removed, the alluvial material held behind it washed out, causing channels to down-cut and eventually widen, allowing for increased thermal loading and stream heating.

Channel widening is often related to degraded riparian conditions that allow increased streambank erosion and sedimentation of the streambed. Both active streambank erosion and sedimentation correlate strongly to riparian vegetation type and age. Riparian vegetation contributes to rooting strength and floodplain/streambank roughness that dissipates erosive energies associated with flowing water. Established mature woody riparian vegetation adds the highest rooting strengths and floodplain/streambank roughness. Annual (grassy) riparian vegetation communities offer less rooting strength and floodplain/streambank roughness. It is expected that width to depth ratios would be lower (narrower and deeper channels) when established mature woody vegetation is present. Annual (grassy) riparian communities may allow channels to widen and become shallower.

Changes in sediment input can lead to a change in channel morphology. When sediment input increases over the transport capability of the stream, sediment deposition can result in channel filling, thereby increasing the width-depth ratio. During storm events, management-related sources can increase sediment inputs over natural levels and contribute to channel widening and stream temperature increases. Natural erosion processes occurring in the plan area such as landslides, surface erosion, and flood events contribute to increased sedimentation (USDI and USDA 1997:99). Sediment sources resulting from human activities include roads; logging (tractor skid trails, yarding corridors, and landings); off-highway vehicle (OHV) trails; concentrated livestock grazing in riparian zones; residential and agricultural clearing of riparian zones; maintenance of irrigation diversions; irrigation return flows; and irrigation ditch blowouts (USDI and USDA 1997:99). Roads appear to be the primary human-caused sediment source from BLM-administered lands in the plan area.

Temperature Factor 3: Streamflow

Streamflow can influence stream temperature. The temperature change produced by a given amount of heat is inversely proportional to the volume of water heated (USDA and USDI 2005). A stream with less flow will heat up faster than a stream with more flow given all other channel and riparian characteristics are the same.

The Big Butte Creek Watershed experiences extreme flow conditions typical of southwest Oregon streams. Historical flows are a function of seasonal weather patterns: rain and snow in the winter months contribute to high flow volumes, while the summer dry season reduces flow.

Big Butte Springs provides a steady supply of high quality water on a year-round basis to the City of Medford. Average daily flows are about 26 million gallons per day (about 40 CFS) (USDA 1995). The Town of Butte Falls gets its water from Ginger Springs, located about one mile south of town (USDI 1995). Water diversion by the Eagle Point Irrigation district from South Fork of Big Butte Creek removes 100 cubic feet per second (cfs) used to generate electricity at a small hydroelectric plant. The water is then returned to Nichols Creek, a tributary to Little Butte Creek. Water is diverted from South Fork Big Butte Creek to provide water to the fish hatchery just east of the town of Butte Falls at 15.5 cfs. This water is returned to the system via Ginger Creek (USDI 1995).

Water withdrawals and irrigation return flows likely result in increased thermal loads within the Big Butte Creek Watershed. The management of water withdrawals is within the jurisdiction of the Oregon Water Resources Department (OWRD).

Temperature Factor 4: Natural Sources

Natural processes that may elevate stream temperature include drought, floods, fires, insect and disease damage to riparian vegetation, and blowdown in riparian areas. The gain and loss of riparian vegetation by natural process will fluctuate within the range of natural variability. The processes in which natural conditions affect stream temperature include increased stream surface exposure to solar radiation and decreased summertime flows (ODEQ 2004:9). These natural events and their effects on stream temperature are considered natural background and no attempt is made to quantify the impact or frequency of such events in this WQRP.

Temperature TMDL Loading Capacity and Allocations

DEQ's 2004/2006 303(d) list identifies seven streams (Big Butte, Clark, Dog, Doubleday, Hukill, Jackass, and North Fork Big Butte Creeks) within the plan area that exceed the numeric water quality criteria from the 1996 and 2004 standards (64°F and 60.8°F, respectively). In the absence of a completed TMDL and related analysis, this condition requires that the standard "no measurable surface water temperature increase resulting from anthropogenic activities is allowed" is met (ODEQ 2004:10).

For the plan area, loading capacity is defined as the thermal load in btu/ft^2/day when: (1) National Pollution Discharge Elimination System (NPDES) permitted point source effluent discharge results in no measurable temperature increases in surface waters and (2) solar loading is reduced to that of system potential (ODEQ 2004:10).

Prior to the completion of the TMDL for the plan area, guidance from the DEQ assumes that streams at system potential will not meet the temperature criterion during the hottest time of year (ODEQ 2004:11). Therefore, 100 percent of the load allocation for the Big Butte Watershed is assigned to natural sources and the allocation for BLM-managed lands is zero percent. Any activity that results in anthropogenic-caused heating of the stream is unacceptable. This load allocation may be modified upon completion of the Rogue Basin TMDL.

The TMDL temperature load allocation for BLM-managed lands is defined as system potential riparian conditions. System potential is the near stream vegetation community that can grow and reproduce on a site, given elevation, soil properties, plant biology, and hydrologic processes (ODEQ 2003). System potential is an estimate of a condition without anthropogenic activities that disturb or remove near-stream vegetation (ODEQ 2003).

The nonpoint source loading allocation is defined as the amount of solar radiation that reaches a stream surface when riparian vegetation and stream channels have achieved system potential. A TMDL allows for the use of surrogate measures to achieve loading capacity. Percent-effective shade serves as the surrogate measure for meeting the temperature TMDL. Percent-effective shade is defined as the percent reduction of solar radiation load delivered to the water surface (ODEQ 2003). It can be measured in the field and relates directly to solar loading.

System potential shade targets (percent-effective shade) along with current shade were calculated for six streams on BLM-administered lands within the Big Butte Watershed: Big Butte, Clark, Dog, Jackass, and North Fork Big Butte Creeks (Table 8). The Shadow model (USDA 1993) was used for the shade assessment. The Shadow model determines the system potential targets and number of years needed to obtain shade recovery using forest growth curves for various tree species within southwestern Oregon. The growth curves project growth rates and maximum heights for the dominant riparian tree species. Target shade values represent the maximum potential stream shade based on the system potential tree height.

The BLM-administered lands along the assessed reaches of Clark, Dog, Jackass Creeks meet the target shade. The BLM-administered lands on the assessed reaches of Big Butte Creek and North Fork Big Butte Creeks need 80 and 45 years, respectively, to reach the target shade.

Table 8. Percent-Effective Shade Targets for BLM-Managed Lands in the Big Butte Watershed (ODEQ 2004: Appendix A)

Stream	Tributary to	Stream Miles Assessed on BLM	Current Shade[1] (%)	Target Shade[1] (%)	Additional Shade Needed[2] (%)	Time to Recovery[3] (years)
Big Butte Creek	Rogue River	2.1	52	80	32	80
Clark Creek	Big Butte Creek	2.1	93	93	0	0
Dog Creek	Big Butte Creek	0.8	88	88	0	0
Jackass Creek	North Fork Big Butte Creek	2.3	89	89	0	0
North Fork Big Butte Creek	Big Butte Creek	6	72	83	11	45

1 Current shade and target shade refer to percent-effective shade defined as the percent reduction of solar radiation load delivered to the water surface. Shade values are averages for all BLM stream miles assessed.

2 Additional shade needed is the increase in percent-effective shade required to meet the target shade.

3 If current shade is greater than or equal to the target shade, the time to recovery is listed as 0 years. If current shade is less than the target shade, the time to recovery is listed as the number of years needed to reach full system potential percent-effective shade. At a value equal to the target shade or ≥ 80 percent effective shade, a stream is considered recovered and the stream should not be a candidate for active restoration. Additional shade should come from passive management of the riparian area. Any increase over the target shade or 80 percent effective shade is considered a margin of safety. Years to recovery are a weighted average of recovery time for individual stream reaches.

D. E. Coli

Introduction

Water contact recreation is the most sensitive beneficial use affected by high levels of *Esherichia coli* for freshwaters (ODEQ 1998:11).

The current Oregon water quality bacteria standard is found in chapter 340, division 41, section 9 of the Oregon Administrative Rules (OAR) (ODEQ 2006). The following is an excerpt from the standard that applies to nonpoint sources in the Big Butte Watershed.

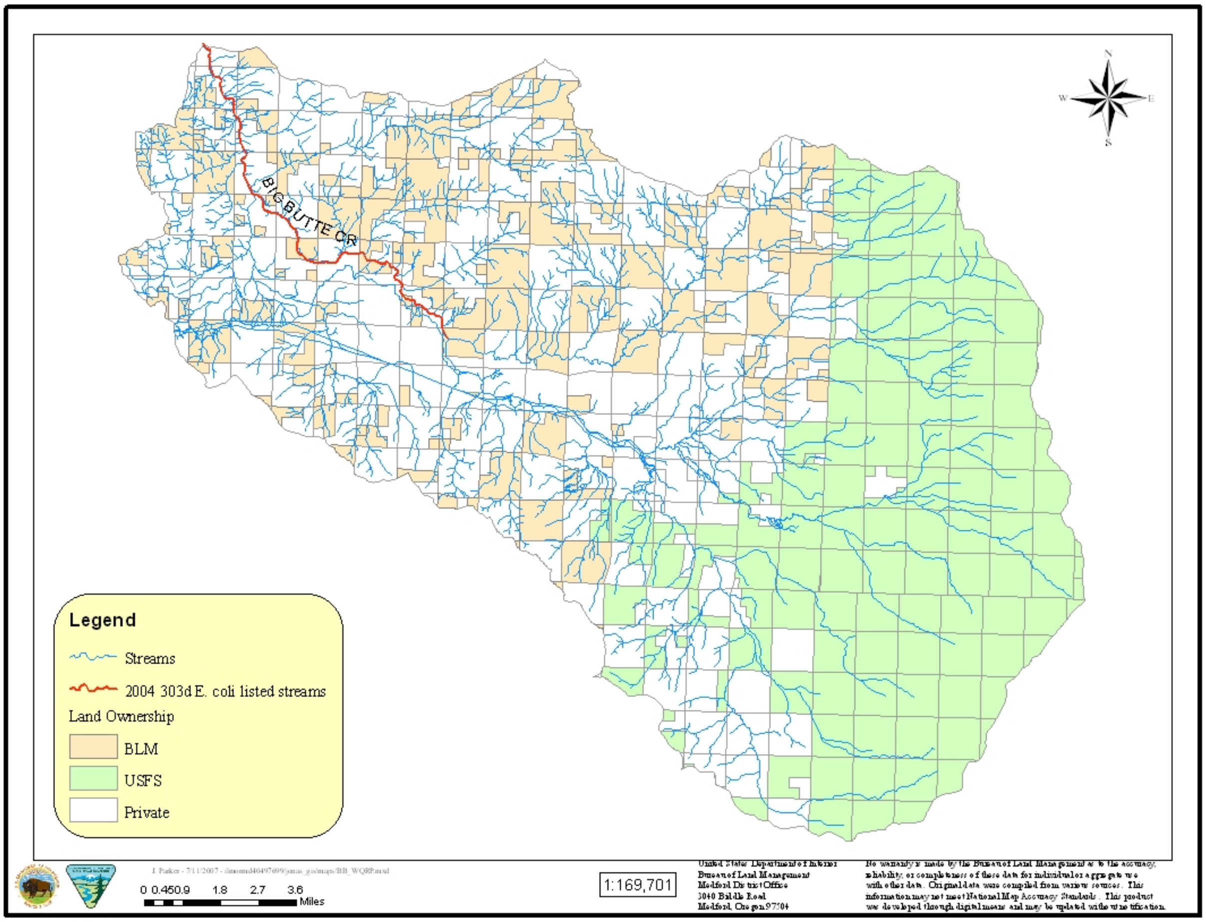
> *(1) Numeric Criteria: Organisms of the coliform group commonly associated with fecal sources (MPN or equivalent membrane filtration using a representative number of samples) may not exceed the criteria described in paragraphs (a) and (b) of this paragraph:*
>
> *(a) Freshwaters and Estuarine Waters Other than Shellfish Growing Waters:*
> *(A) A 30-day log mean of 126 E. coli organisms per 100 milliliters, based on a minimum of five (5) samples;*
> *(B) No single sample may exceed 406 E. coli organisms per 100 milliliters.*
>
> *(3) Animal Waste: Runoff contaminated with domesticated animal wastes must be minimized and treated to the maximum extent practicable before it is allowed to enter waters of the State.*
>
> *(4) Bacterial pollution or other conditions deleterious to waters used for domestic purposes, livestock watering, irrigation, bathing, or shellfish propagation, or otherwise injurious to public health may not be allowed.*
>
> *(10) Water Quality Limited for Bacteria: In those water bodies, or segments of water bodies identified by the Department as exceeding the relevant numeric criteria for bacteria in the basin standards and designated as water-quality limited under section 303(d) of the Clean Water Act, the requirements specified in section 11 of this rule and in OAR 340-041-0061 (12) must apply.*
>
> *(11) In water bodies designated by the Department as water-quality limited for bacteria, and in accordance with priorities established by the Department, development and implementation of a bacteria management plan may be required of those sources that the Department determines to be contributing to the problem. The Department may determine that a plan is not necessary for a particular stream segment or segments within a water-quality limited basin based on the contribution of the segment(s) to the problem. The bacteria management plans will identify the technologies, best management practices and/or measures and approaches to be implemented by point and nonpoint sources to limit bacterial contamination. For nonpoint sources, the bacteria management plan will be developed by designated management agencies (DMAs) which will identify the appropriate best management practices or measures and approaches.*

The 2004/2006 303(d) list includes one stream within the Big Butte Creek Watershed that is listed for exceeding E. coli standards which is Big Butte Creek (Table 9 and Figure 10). There are 2 miles of E. coli-listed streams on BLM-administered lands within the Big Butte Creek Watershed.

Table 9. 303(d) E. coli-Listed Reaches in the Big Butte Creek Watershed

303(d) List Date	Stream Segment	Season	Applicable Rule (at time of listing)	Total Miles Affected	BLM Miles Affected
2004	Big Butte Creek	Summer	OAR 340-041-0009(1)(a)(A,B)	11.6	2
Total Stream Miles listed for E. coli Criteria (Summer)				**11.6**	**2**

Figure 10. 2004/2006 303(d) E. coli-Listed Streams for the Big Butte Creek Watershed



E. coli Sources

Fecal coliform bacteria are produced in the guts of warm-blooded vertebrate animals, and indicate the presence of pathogens that cause illness in humans. E. coli is a species of fecal coliform bacteria. A variety of everyday activities cause bacterial contamination in surface waters (ODEQ 2004:9). The largest sources of contamination include runoff from agricultural, industrial, rural and urban residential activities (ODEQ 2004:9). Sources of bacteria from BLM-administered lands include animal feces (wild and domestic, including livestock such as cattle) and inadequate waste disposal by recreational users.

E. coli TMDL Loading Capacity and Allocations

Prior to completion of the Rogue Basin TMDL, the DEQ has estimated the TMDL loading capacity for E. coli.

The loading capacity for E. coli in the plan area is defined as (1) the greatest amount of E. coli loading that a 303(d)-listed waterway can contain and still attain water quality standards and (2) NPDES permitted point source effluent discharges meet permit requirements for E. coli (ODEQ 2004:10).

Management measures used to limit the presence of livestock in stream channels or riparian zones in order to reduce sedimentation will also minimize the amount of bacterial contamination in surface water from BLM-managed lands.

E. Dissolved Oxygen (DO)

Introduction

Beneficial uses affected by DO values outside the standard include resident fish and aquatic life, salmon and steelhead spawning, resident trout spawning, cold-water aquatic life, cool-water aquatic life, warm-water aquatic life, and estuarine water (ODEQ 1998:23).

The current Oregon water quality DO standard for the Rogue Basin is found in chapter 340, division 41, section 16 of the Oregon Administrative Rules (OAR) (ODEQ 2006). The following is an excerpt from the standard that applies to nonpoint sources in the Big Butte Watershed.

> *(1) For water bodies identified as active spawning areas the following criteria apply during the applicable spawning through fry emergence periods set forth in the tables and figures and, where resident trout spawning occurs, during the time trout spawning through fry emergence occurs:*
>
> > *(a) The dissolved oxygen may not be less than 11.0 mg/l. However, if the minimum intergravel dissolved oxygen, measured as a spatial median, is 8.0 mg/l or greater, then the DO criterion is 9.0 mg/l;*
> >
> > *(b) Where conditions of barometric pressure, altitude, and temperature preclude attainment of the 11.0 mg/l or 9.0 mg/l criteria, dissolved oxygen levels must not be less than 95 percent of saturation;*
> >
> > *(c) The spatial median intergravel dissolved oxygen concentration must not fall below 8.0 mg/l.*
>
> *(2) For water bodies identified by the Department as providing cold-water aquatic life, the dissolved oxygen may not be less than 8.0 mg/l as an absolute minimum. Where conditions of barometric pressure, altitude, and temperature preclude attainment of the 8.0 mg/l, dissolved oxygen may not be less than 90 percent of saturation. At the discretion of the Department, when the Department determines that adequate information exists, the dissolved oxygen may not fall below 8.0 mg/l as a 30-day mean minimum, 6.5 mg/l as a seven-day minimum mean, and may not fall below 6.0 mg/l as an absolute minimum (Table 21);*
>
> *(3) For water bodies identified by the Department as providing cool-water aquatic life, the dissolved oxygen may not be less than 6.5 mg/l as an absolute minimum. At the discretion of the Department, when the Department determines that adequate information exists, the dissolved oxygen may not fall below 6.5 mg/l as a 30-day mean minimum, 5.0 mg/l as a seven-day minimum mean, and may not fall below 4.0 mg/l as an absolute minimum (Table 21);*

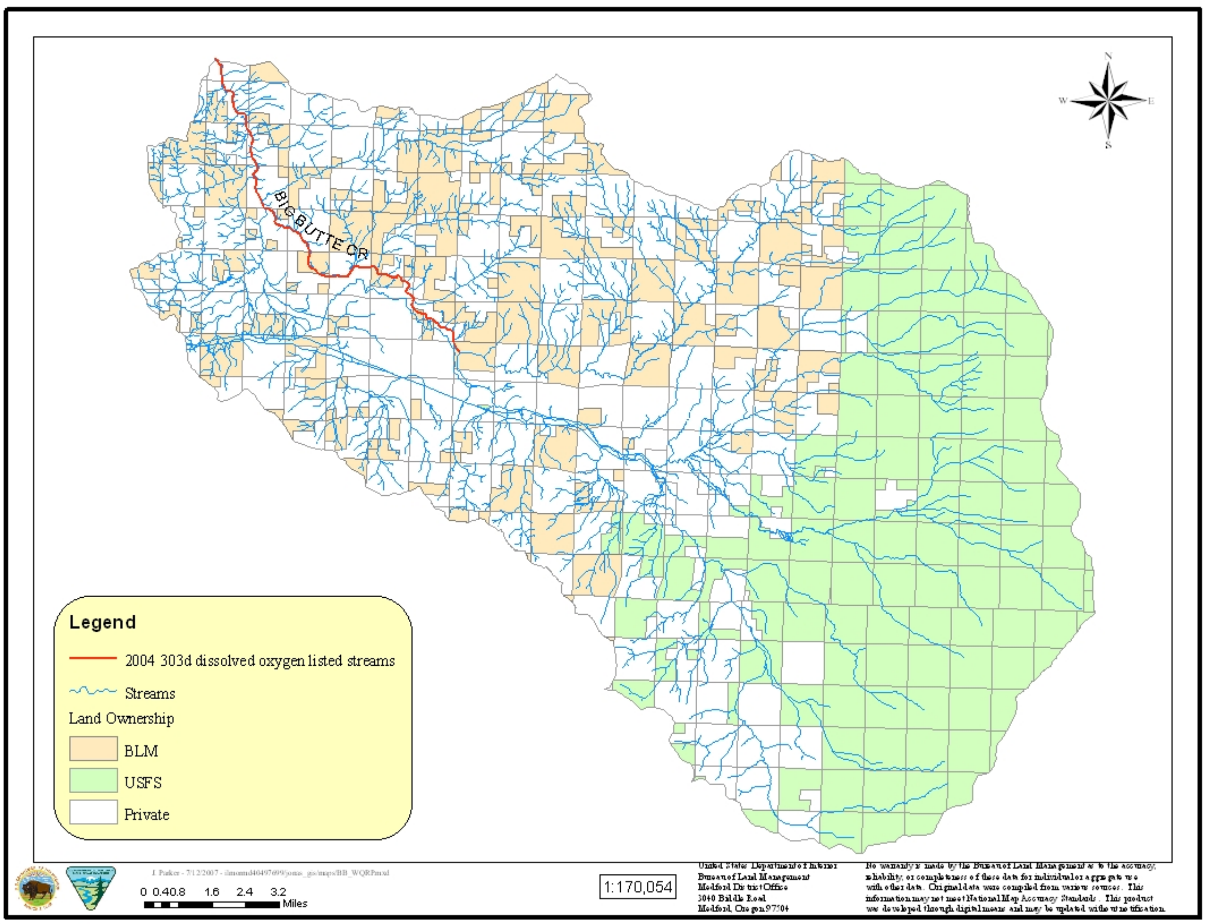
(4) For water bodies identified by the Department as providing warm-water aquatic life, the dissolved oxygen may not be less than 5.5 mg/l as an absolute minimum. At the discretion of the Department, when the Department determines that adequate information exists, the dissolved oxygen may not fall below 5.5 mg/l as a 30-day mean minimum, and may not fall below 4.0 mg/l as an absolute minimum (Table 21);

Big Butte Creek is the only stream in the Big Butte Creek Watershed listed for DO on the 2004/2006 303(d) list (Table 10 and Figure 11). Only 2 miles of the 11.6 miles listed for DO on the Big Butte Creek are on BLM-administered lands.

Table 10. 303(d) DO-Listed Reaches in the Big Butte Creek Watershed (2004 List Date)

303(d) List Date	Stream Segment	Season	Applicable Rule (at time of listing)	Total Miles Affected	BLM Miles Affected
2004	Big Butte Creek	Summer	OAR 340-041-0016(1)(a)(c)(2)	11.6	2.0
Total Stream Miles listed for DO Criteria (Summer)				**11.6**	**2.0**

Figure 11. 2004/2006 303(d) Dissolved Oxygen (DO) Listed Streams for the Big Butte Creek Watershed



DO Sources

Low summertime stream DO values in the Big Butte Creek probably result from high temperatures and lack of turbulence during summer low flows. DO generally is not sensitive to forest management activities that avoid adding logging slash to streams and use stream buffers to protect stream temperature. Reduced concentrations of DO in streams occur when conditions include low flows, warm temperatures, shallow stream gradients, fresh organic matter inputs, and high respiration rates (MacDonald et al. 1991:82). Current forest management activities and the use of stream buffers suggest that reduced levels of DO in streams from forest management would occur only under unusual circumstances (MacDonald et al. 1991:81).

DO TMDL Loading Capacity and Allocations

Prior to completion of the Rogue Basin TMDL, the DEQ has estimated the TMDL loading capacity for DO.

The loading capacity for DO in the plan area is defined as (1) the load allocations (both nonpoint and point source) for temperature are met and (2) NPDES permitted point source effluent discharges meet permit requirements for DO (ODEQ 2004:11).

There are no point source discharges on BLM-administered lands within the Big Butte Watershed, therefore the second loading capacity statement does not apply to BLM management.

In the absence of modeling, it is anticipated that the achievement of the temperature load allocation will reduce periphyton and lead to the attainment of the water quality standards for DO. The temperature section of this WQRP addresses how the nonpoint source temperature load allocation will be achieved on BLM-managed lands.

Element 2. Goals and Objectives

The overall long-term goal of this WQRP is to achieve compliance with water quality standards for the 303(d) listed streams in the Big Butte Watershed. The WQRP identifies TMDL implementation strategies to achieve this goal. Recovery goals will focus on protecting areas where water quality meets standards and avoiding future impairments of these areas, and restoring areas that do not currently meet water quality standards.

The recovery of water quality conditions on BLM-administered land in the Big Butte Watershed will be dependent upon implementation of the BLM Medford District Resource Management Plan (RMP) (USDI 1995a, USDI 1995b) that incorporate the NWFP (USDA and USDI 1994). The RMP includes best management practices (BMPs) that are intended to prevent or reduce water pollution to meet the goals of the Clean Water Act.

Paramount to recovery is adherence to the Standards and Guidelines of the NWFP (as amended, USDA and USDI 2004) to meet the ACS. This includes protection of riparian areas and necessary silvicultural treatments to achieve vegetative potential as rapidly as possible. The ACS was developed to restore and maintain the ecological health of watersheds and aquatic ecosystems on public lands. The NWFP requires federal decision makers to ensure that proposed management activities are consistent with ACS objectives. The NWFP amendment in March 2004 clarified provisions relating to the ACS. It explains that the ACS objectives were intended to be applied and achieved at the fifth-field watershed and larger scales, and over a period of decades or longer rather than in the short-term. ACS objectives are listed on page B-11 of the NWFP Record of Decision (ROD) (USDA and USDI 1994). Together these objectives are intended to enhance biodiversity and ecosystem function for fish, wildlife, and vegetation, enhance soil productivity and water quality, and reduce hazardous fuel loads and risk to uncharacteristic disturbance (USDA and USDI 2005:46). ACS objectives 3-8 contain guidance related to maintaining and restoring water quality. In general, the objectives are long range (10 to 100 years) and strive to maintain and restore ecosystem health at the watershed scale.

Recovery goals for temperature, E. coli, and DO and restoration techniques for achieving these goals on BLM-administered land are specified in Table 11.

Table 11. Recovery Goals for BLM-Administered Land in the Big Butte Creek Watershed

Element	Goal	Passive Restoration	Active Restoration
Temperature ***Shade***	• Achieve coolest water possible through achievement of percent effective shade targets (Table 8).	• Allow riparian vegetation to grow up to reach target values.[1]	• Use prescriptions that ensure long-term riparian vegetation health. • Implement prescriptions that increase growth rate and survival of riparian vegetation. • Plant native species from local genetic stock to create a stand that will result in increased tree height and density.[1]
Temperature ***Channel Morphology***	• Increase the amount of large wood in channels. • Improve riparian rooting strength and streambank roughness. • Decrease bedload contribution to channels during large storm events. • Maintain or improve channel types, focusing on width-to-depth ratios. • Increase the ratio of wood-to-sediment during mass failures.	• Follow NWFP Standards and Guidelines or watershed analysis recommendations for Riparian Reserve widths (including unstable lands). • Allow historic streambank failures to revegetate. • Allow natural channel evolution to continue. (Time required varies with channel type.)	• Promote riparian conifer growth for future large wood recruitment. • Encourage woody riparian vegetation versus annual species. • Stabilize streambanks where indicated. • Maintain and improve road surfacing. • Reduce road densities by decommissioning non-essential roads. • Increase culverts to 100-yr flow size and/or provide for overtopping during floods. • Minimize future slope failures through stability review and land reallocation if necessary. • Ensure that unstable sites retain large wood to increase wood-to-sediment ratio.
Temperature ***Streamflow***	• Maintain optimum flows for fish life. • Maintain minimum flows for fish passage.		• Utilize authorized water storage facilities to avoid diverting streamflows during low flows.

Element	Goal	Passive Restoration	Active Restoration
E. coli	• Decrease E. coli contamination caused by livestock.		• Manage livestock to prevent concentrations in streams or riparian zones.
DO	• Achieve coolest water possible through achievement of percent effective shade targets (Table 8).	• Follow NWFP Standards and Guidelines or watershed analysis recommendations for Riparian Reserve widths (including unstable lands).	• Use prescriptions that ensure long-term riparian vegetation health.

1/ Passive versus active restoration of riparian areas. If current percent effective shade is greater than or equal to the target shade or 80 percent, the stream is considered recovered in terms of percent effective shade and the riparian area should not be a candidate for active restoration for the purposes of temperature recovery (ODEQ 2004). If current shade does not meet the target shade and is less than 80 percent, the site may benefit from active restoration and should be examined.

Element 3. Proposed Management Measures

The NWFP ACS describes general guidance for managing Riparian Reserves to meet the ACS objectives. The Riparian Reserves, Key Watersheds, watershed analysis, and watershed restoration components of the ACS are designed to operate together to maintain and restore the productivity and resiliency of riparian and aquatic ecosystems.

Specific NWFP Standards and Guidelines (USDA and USDI 1994:C-31-C-38) direct the types of activities that may occur within Riparian Reserves and how they will be accomplished. These Standards and Guidelines effectively serve as general BMPs to prevent or reduce water pollution in order to meet the goals of Clean Water Act compliance. As a general rule, the Standards and Guidelines for Riparian Reserves prohibit or regulate activities in Riparian Reserves that retard or prevent attainment of the Aquatic Conservation Strategy objectives. Riparian Reserve widths are determined from the Standards and Guidelines (USDA and USDI 1994, p. C-30). The minimum reserve width for fish-bearing streams, lakes, and natural ponds is 300 feet slope distance on each side of the stream or waterbody. Perennial non-fish-bearing streams, constructed ponds and reservoirs, and wetlands greater than 1 acre receive a minimum reserve width of 150 feet slope distance on each side of the stream or waterbody. Intermittent streams receive a minimum reserve width of 100 feet slope distance on each side of the stream and Riparian Reserves for wetlands less than 1 acre include the wetland and extend to the outer edges of the riparian vegetation.

The Medford District RMP includes BMPs that are important for preventing and controlling nonpoint source pollution to the "maximum extent practicable" (USDI 1995a:149-177; USDI 1995b:D1-D46). BMPs are developed on a site-specific basis and presented for public comment during the National Environmental Policy Act (NEPA) process. One element of BMP implementation includes effectiveness monitoring and modification of BMPs when water quality goals are not being achieved.

Although passive restoration will be the primary means to achieving the stream shade goal (Table 20), active restoration measures will be considered for streams with current shade that is less than 80 percent (Table 7). The *Northwest Forest Plan Temperature TMDL Implementation Strategies* (USDA and USDI 2005) provides a tool for analyzing the effect of silvicultural practices within Riparian Reserves on effective shade. Shade nomographs were computed based on stream width, vegetation height, hill slope, and orientation factors and provide no-cut buffer widths to maintain stream shade while applying vegetation treatments to improve and restore riparian conditions.

The primary means to achieving the channel morphology goals (Table 20) on BLM-administered lands will be through passive restoration and protection of unstable areas. Active restoration measures will focus on promoting riparian conifer growth for future large wood recruitment through silvicultural practices, maintaining and improving road surfaces, and reducing road densities. The highest priority areas for road treatments will be in the Riparian Reserves and unstable areas.

Grazing allotment assessments and evaluations will identify specific grazing problems that are contributing to bacteria. Corrective management measures will be implemented according to site-specific NEPA analysis.

Minimizing management-caused sunlight and nutrient inputs to streams through appropriate BMPs will be the key measures used to prevent increases in DO.

Element 4. Time Line for Implementation

The major provisions of this plan have already been implemented. Protection of riparian areas along all streams has been ongoing since the NWFP became effective in 1994. Inherent in the NWFP implementation is the passive restoration of riparian areas that ensued as a result of the Riparian Reserves. Implementation of active restoration activities beyond the inherent passive riparian restoration occurs in the context of watershed analysis and through site-specific projects. Restoration projects require analysis under the NEPA. The timing for implementation of those activities is dependent on funding availability.

The problems leading to water quality limitations and 303(d) listing have accumulated over many decades. Natural recovery and restorative management actions to address these problems will occur over an extended period of time. Implementation will continue until the restoration goals, objectives, and management measures as described in this WQRP are achieved. While active restoration may provide immediate, localized improvement, recovery at the watershed scale is long term in nature. The ACS contained in the NWFP (as amended, USDA and USDI 2004) describes restoration timeframes. ACS seeks to "prevent further degradation and restore habitat over broad landscapes as opposed to individual projects or small watersheds. Because it is based on natural disturbance processes, it may take decades, possibly more than a century to achieve objectives."

Stream temperature and habitat recovery is largely dependent on vegetation recovery. Actions implemented now will not begin to show returns in terms of reduced stream temperatures or improved aquatic habitat for a number of years. Full recovery of these conditions will not occur for many decades (Table 8). Stream temperatures will begin to decline and recover before the riparian areas reach their maximum potentials. Growth of the future system potential vegetation was modeled with the assumption that there will be no management activities such as thinning to enhance growth. If silvicultural activities were to occur, the vegetation would grow more quickly and recovery could be accelerated.

It will take a longer time for aquatic habitat recovery than for shade recovery. Instream conditions will recover only after mature conifers begin to enter the waterways through one of several delivery mechanisms, e.g. blowdown, wildfire, debris flows down tributary streams and into fish-bearing reaches, and flooding. Tree growth from the current condition of young conifers to mature age conifers will take approximately 200 to 250 years. This will represent full biological recovery of these stream channels, while temperature recovery and stabilization of streambanks will occur earlier.

Element 5. Responsible Parties

The BLM is recognized by Oregon DEQ as a Designated Management Agency for implementing the Clean Water Act on BLM-administered lands in Oregon. The BLM has signed a Memorandum of Agreement (MOA) with the DEQ that defines the process by which the BLM will cooperatively meet State and Federal water quality rules and regulations. The Director of DEQ and the BLM State Director are responsible for ensuring implementation of the agency's MOA.

The BLM's Butte Falls Field Manager is responsible for ensuring this WQRP is implemented, reviewed, and amended as needed. These officials are responsible for all WQRPs for lands under their jurisdiction. The field manager will ensure coordination and consistency in plan development, implementation, monitoring, review, and revision. The manager will also ensure priorities are monitored and revised as needed and review and consider funding needs for this and other WQRPs in annual budget planning.

Element 6. Reasonable Assurance of Implementation

This WQRP will be submitted to the DEQ and it will be incorporated in the Rogue Basin WQMP, which is currently scheduled for completion in 2008. The WQMP will cover all land within the Big Butte Watershed regardless of jurisdiction or ownership.

The BLM is committed to working cooperatively with all interested parties in the plan area. While partnerships with private, local, and state organizations will be pursued, the BLM can only control the implementation of this WQRP on BLM-administered lands. It must be noted that only 32 percent of the 303(d) listed stream miles in the plan area are located on lands under BLM jurisdiction. Other organizations or groups that are (or will be) involved in partnerships for implementing, monitoring, and maintaining the Rogue Basin WQMP include the Upper Rogue Watershed Association, Jackson County, Oregon Department of Forestry (ODF), Oregon Department of Agriculture (ODA), Oregon Department of Transportation (ODOT), Oregon Department of Fish and Wildlife (ODFW), Oregon Water Resources Department (WRD), Oregon DEQ, and the U.S. Forest Service. The problems affecting water quality are widespread; coordination and innovative partnerships are key ingredients to successful restoration efforts.

The BLM, Medford District intends to implement this plan within current and future funding constraints. Implementation and adoption of the MOA with the DEQ also provide assurances that water quality protection and restoration on lands administered by the BLM will progress in an effective manner.

Element 7. Monitoring and Evaluation

Monitoring and evaluation have two basic components: 1) monitoring the implementation and effectiveness of this WQRP and 2) monitoring the physical, chemical, and biological parameters for water quality. Monitoring information will provide a check on progress being made toward achieving the TMDL allocations and meeting water quality standards, and will be used as part of the Adaptive Management process.

The objectives of this monitoring effort are to demonstrate long-term recovery, better understand natural variability, track implementation of projects and BMPs, and evaluate effectiveness of TMDL implementation. This monitoring and feedback mechanism is a major component of the "reasonable assurance of implementation" for this WQRP.

The NWFP and the BLM Medford District RMP are ongoing federal land management plans. The NWFP, effective in 1994, requires that if results of monitoring indicate management is not achieving ACS objectives, among them water quality, plan amendments may be required. These plan amendments could, in part, redirect management toward attainment of state water quality standards.

The RMP was implemented in 1995 and the BLM is in the initial stage of revising the RMPs for western Oregon with an anticipated completion date of summer 2008. The current plan contains requirements for implementation, effectiveness, and validation monitoring of BMPs for water resources. The Medford District annual program summaries provide feedback and assess the progress of RMP implementation.

RMP monitoring will be conducted as identified in the approved BLM Medford District plans. Monitoring will be used to ensure that decisions and priorities conveyed by BLM management plans are being implemented, to document progress toward attainment of state water quality standards, to identify whether resource management objectives are being attained, and to document whether mitigating measures and other management direction are effective.

DEQ will evaluate progress of actions to attain water quality standards after TMDLs are developed and implemented. If DEQ determines that implementation is not proceeding or if implementation measures are in place, but water quality standards or load allocations are not or will not be attained, then DEQ will work with the BLM to assess the situation and to take appropriate action. Such action may include additional implementation measures, modifications to the TMDL, and/or placing the water body on the 303(d) list when the list is next submitted to EPA.

WQRP Implementation and Effectiveness Monitoring

Restoration activities that benefit aquatic resources will be provided annually to the Interagency Restoration DAtabase (IRDA). This database was developed by the Regional Ecosystem Office (REO) to track all restoration accomplishments by federal agencies in the areas covered by the NWFP. It is an ArcView-based application and is available via the Internet at the REO website (http://www.reo.gov). It also contains data from the State of Oregon. The IRDA is intended to provide for consistent and universal reporting and accountability among federal agencies and to provide a common approach to meeting federal agency commitments made in monitoring and reporting restoration efforts in the Oregon Coastal Salmon Restoration Initiative. Activities that are tracked include in-stream structure and passage, riparian treatments, upland treatments, road decommissioning and improvements, and wetland treatments.

In addition, implementation and effectiveness monitoring will be accomplished for restoration projects according to project level specifications and requirements.

Water Quality Monitoring

Water quality monitoring is critical for assessing the success of this WQRP. This data will be used to evaluate the success of plan implementation and effectiveness. Ongoing monitoring will detect improvements in water quality conditions as well as the progress toward attaining water quality standards.

The base water quality monitoring program will include continued stream temperature monitoring on streams that are water quality limited for temperature on BLM-administered land. Additional core indicators of water quality and stream health including stream temperature for non-303(d)-listed reaches, stream shade, and stream channel condition will be monitored on BLM-administered land if funds and personnel are available.

Monitoring results associated with compliance with this WQRP will be submitted to the DEQ upon request.

Stream Temperature Monitoring

The BLM has collected stream temperature data in the Big Butte Watershed since 1994 and will continue to monitor stream temperatures (as long as funding is available) in order to detect any changes in temperature from long-term data sets. Monitoring is conducted to meet a variety of objectives, thus long-term monitoring sites as well as project-specific, short-term sites will be used. Objectives include: monitor long-term temperature recovery; better understand the natural temperature variability; and track potential project effects. If funding is available, annual monitoring will continue on the following temperature-listed stream reaches until such time as they reach the state standard: Big Butte Creek, Clark Creek, Dog Creek, Doubleday Creek, Hukill Creek, Jackass Creek, and North Fork Big Butte Creek.

Sampling methods and quality control for any future temperature monitoring will follow DEQ protocol. Generally, stream temperatures will be monitored from June 1 to September 30 to ensure that critical high temperature periods are covered. Measurements will be made with sensors programmed to record samples at least hourly. Qualified personnel will review raw data and delete erroneous data due to unit malfunction or other factors. Valid data will be processed to compute the 7-day rolling average of daily maximum temperature at each site. The resulting files will be stored in the BLM's database.

Stream Shade Monitoring
Guidelines in the Northwest Forest Plan specify that vegetation management activities that occur within the Riparian Reserves must have a goal of improving riparian conditions. The existing level of stream shade provided by the adjacent riparian stand will be determined prior to Riparian Reserve treatments that have the potential to influence water temperature. Measurement of angular canopy density (the measure of canopy closure as projected in a straight line from the stream surface to the sun) will be made in a manner that can be repeated within the portion of the adjacent stand within one tree height of the streambank at bankfull width. The measurement will occur within the stand, and not be influenced by the opening over the actual stream channel. Immediately after treatment, the shade measurement procedure will be repeated to verify that the treatment met the prescribed goals.

Stream Channel Condition and Sedimentation Monitoring
Restoration activities designed to improve stream channel conditions and reduce sediment delivery (i.e. road surface and drainage improvements, road decommissioning, and unstable area protection) will be included in the IRDA.

Monitoring Data and Adaptive Management
This WQRP is intended to be adaptive in nature. Sampling methodology, timing, frequency, and location will be refined as appropriate based on lessons learned, new information and techniques, and data analysis. A formal review involving BLM and DEQ will take place every five years, starting in 2011, to review the collected data and activity accomplishment. This ensures a formal mechanism for reviewing accomplishments, monitoring results, and new information. The evaluations will be used to determine whether management actions are having the desired effects or if changes in management actions and/or TMDLs are needed.

Element 8. Public Involvement

The Federal Land Policy Management Act (FLPMA) and the NEPA require public participation for any activities proposed for federal lands. The NWFP and the Medford District RMP went through an extensive public involvement process. Many of the elements contained in this WQRP are derived from these existing land use planning documents.

Public involvement was also included in the development of the *Lower Big Butte Watershed Analysis* and the *Central Big Butte Watershed Analysis*. Additionally, the NEPA process requires public involvement prior to land management actions, providing another opportunity for public participation. During this process, the BLM sends scoping letters and schedules meetings with the public. The public comment period ensures that public participation is incorporated into the decision-making process.

The DEQ has lead responsibility for creating Total Maximum Daily Loads (TMDLs) and WQMPs to address water quality impaired streams for Oregon. This WQRP will be provided to the DEQ for incorporation into the Rogue Basin WQMP. The WQMP development will include public involvement.

Element 9. Costs and Funding

Active restoration can be quite costly, especially for road upgrades and major culvert replacements. The cost varies with the level of restoration. The cost of riparian silvicultural treatments on forested lands is generally covered with appropriated funds and will vary depending on treatment type. The cost of WQRP monitoring will depend on the level of water quality monitoring. The maximum that would be expended is estimated to be $15,000 per year and would include data collection, database management, data analysis, and report preparation.

Funding for project implementation and monitoring is derived from a number of sources. Implementation of the proposed actions discussed in this document will be contingent on securing adequate funding. Funds for project implementation originate from grants, cost-share projects, specific budget requests, appropriated funds, revenue generating activities (such as timber sales), or other sources. Potential sources of funding to implement restoration projects on federal lands include BLM Clean Water and Watershed Restoration funds and Title 2 funds from the Secure Rural Schools and Community Self-Determination Act of 2000 (Public Law 106-393).

The Title 2 program began in FY 2000 and will continue through FY 2007. Projects funded by the Title 2 program must meet certain criteria and be approved by the appropriate resource advisory committee. At least 50 percent of all project funds must be used for projects that are primarily dedicated to: road maintenance, decommissioning, or obliteration; or restoration of streams and watersheds. The available funds are based on County payments.

It is important to note that many of the specific management practices contained in this WQRP are the implementation of BMPs during ongoing management activities such as timber harvest, silvicultural treatments, fuels management, etc. These practices are not dependent on specific restoration funding.

Work on federal lands will be accomplished to improve water quality as quickly as possible by addressing the highest existing and at-risk management-related contributors to water quality problems. Every attempt will be made to secure funding for restoration activity accomplishment but it must be recognized that the federal agencies are subject to political and economic realities. Currently, timber harvest is minimal due to lawsuits and the requirements of the clearances needed to proceed. If this situation continues, a major source of funding is lost. Historically, budget line items for restoration are a fraction of the total requirement. Therefore, it must be recognized that restoration actions are subject to the availability of funding.

Another important factor for implementation time lines and funding is that managers must consider the Big Butte Watershed along with all other watersheds under their jurisdiction when determining budget allocations.

Element 10. Citation to Legal Authorities

The Endangered Species Act (ESA) and the Clean Water Act (CWA) are two federal laws which guide public land management. These laws are meant to provide for the recovery and preservation of endangered and threatened species and the quality of the nation's waters. The BLM is required to assist in implementing these two laws. The NWFP and RMP are mechanisms for the BLM to implement the ESA and CWA. They provide the overall planning framework for the development and implementation of this WQRP.

Clean Water Act Section 303(d)

Section 303(d) of the 1972 federal CWA as amended requires states to develop a list of rivers, streams, and lakes that cannot meet water quality standards without application of additional pollution controls beyond the existing requirements on industrial sources and sewage treatment plants. Waters that need this additional help are referred to as "water quality limited" (WQL). Water quality limited waterbodies must be identified by the Environmental Protection Agency (EPA) or by a delegated state agency. In Oregon, this responsibility rests with the DEQ. The DEQ updates the list of water quality limited waters every two years. The list is referred to as the 303(d) list. Section 303 of the CWA further requires that TMDLs be developed for all waters on the 303(d) list. A TMDL defines the amount of pollution that can be present in the waterbody without causing water quality standards to be violated. A WQMP is developed to describe a strategy for reducing water pollution to the level of the load allocations and waste load allocations prescribed in the TMDL, which is designed to restore the water quality and result in compliance with the water quality standards. In this way, the designated beneficial uses of the water will be protected for all citizens.

Northwest Forest Plan

In response to environmental concerns and litigation related to timber harvest and other operations on federal lands, the BLM commissioned the Forest Ecosystem Management Assessment Team (FEMAT 1993) to formulate and assess the consequences of management options. The assessment emphasizes producing management alternatives that comply with existing laws and maintaining the highest contribution of economic and social well being. The "backbone" of ecosystem management is recognized as constructing a network of late-successional forests and an interim and long-term scheme that protects aquatic and associated riparian habitats adequate to provide for threatened and at-risk species. Biological objectives of the Northwest Forest Plan include assuring adequate habitat on federal lands to aid the "recovery" of late-successional forest habitat-associated species listed as threatened under the ESA and preventing species from being listed under the ESA.

The RMP for the BLM Medford District provides for water quality and riparian management and is written to ensure attainment of ACS objectives and compliance with the CWA.

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